FEBRUARY, 1953

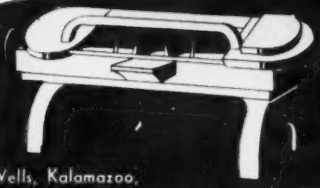
MODERN Machine Shop

LENOX

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- Try our Wavy Set for cutting angle iron, tubing and thin materials.

SAFETY BOX -- 100' COIL STOCK

- For use on Do-All, Grob, Tannewitz and other Band Saw machines.
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AMERICAN SAW & MFG. COMPANY

SPRINGFIELD, MASS.

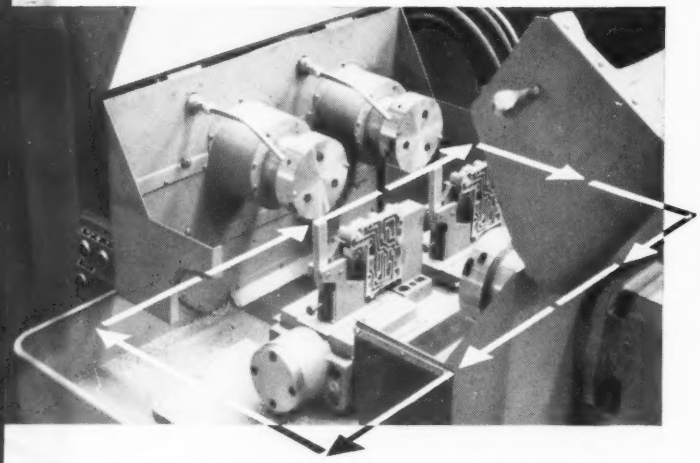
HACK SAWS • BAND SAWS • GROUND FLAT STOCK • HOLE SAWS

FEBRUARY MODERN MACHINE SHOP 1953

Heald Bore-Matic speeds

FLY-CUTTING

. . . gives extra precision, too

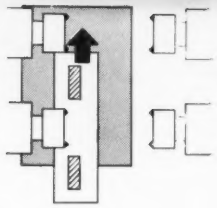


Valve bodies fly-cut on both sides, two parts at a time, in fully automatic high-speed cycle

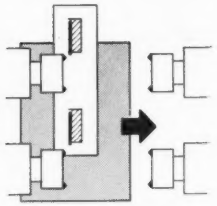
● Many people think of a Heald Bore-Matic only in terms of the conventional boring, facing, turning and chamfering operations. Yet these versatile machines can be equally well applied to a wide variety of other operations—take fly-cutting for example.

Here a model 222 Heald Bore-Matic combines fast automatic cycling with characteristic high precision. Two valve bodies are fly-cut simultaneously as they are indexed past the rotating quills with double tools mounted in the face. The machine is fully automatic, finishing both sides of two parts in a single machine cycle.

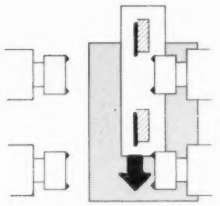
Remember—when it comes to precision finishing, it pays to come to Heald.



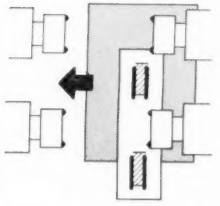
1. *After table rapid traverses left, cross slide feeds to rear and heads fly-cut.*



2. *Table rapid traverses right.*



3. *Cross slide feeds forward. Heads fly-cut.*



4. *Table rapid traverses left to unloading position.*

HEALD

Case Study
No. 2232-96 in
PRECISION PRODUCTION

INTERNAL AND ROTARY SURFACE GRINDING MACHINES AND BORE-MATICS

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Branch Offices: Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

VOLUME 25 NUMBER 9
FEBRUARY, 1953

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MODERN Machine Shop

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1800 Stainless Steel Threads per CHASER GRIND!!



LANDMATIC HEADS are every day saving production dollars for the Crawford Fitting Company of Cleveland by low tool cost and minimum machine downtime.

This company manufactures Swagelok Tube Fittings ranging from ⅛" to 1" in diameter. These fittings are produced from stainless steel tees of austenitic type 316 cold-worked to a Brinell hardness of 250. In producing the 7/16" fitting, for example, (as illustrated) 20-pitch straight UN threads are cut close to the shoulder 5/16" long to Class 3 fit.

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LANDIS Machine COMPANY

WAYNESBORO, PENNSYLVANIA, U. S. A.

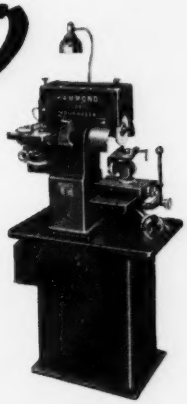
THREADING MACHINERY—THREAD CUTTING DIE HEADS—COLLAPSIBLE TAPS

387

OVER 6000

Hammond

CARBIDE GRINDERS IN SERVICE



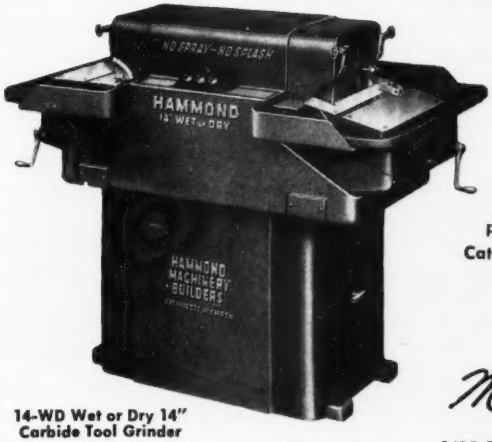
CB-77 Chip Breaker and Diamond Finishing Grinder

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TIME
TOOLS
WHEELS



WD-10 Wet or Dry 10" Carbide Tool Grinder



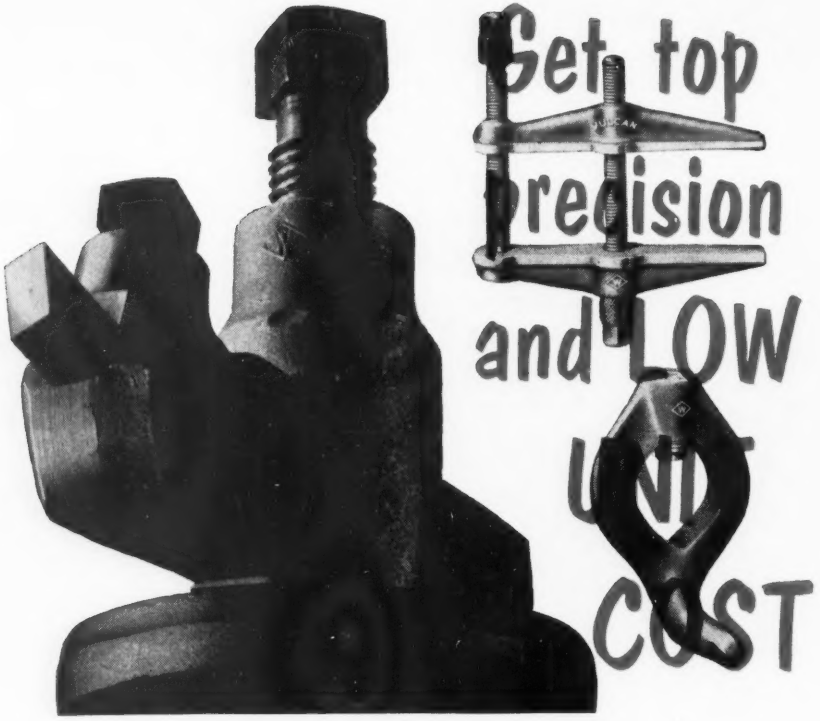
14-WD Wet or Dry 14" Carbide Tool Grinder

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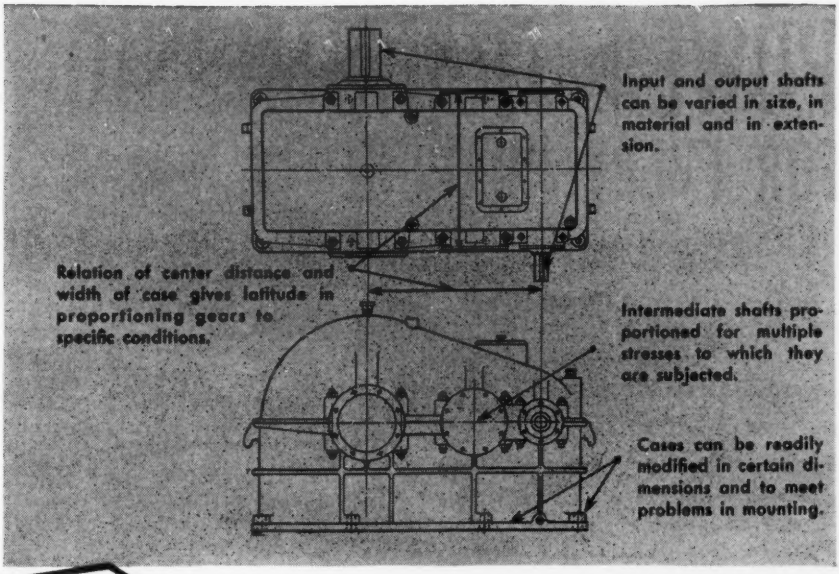
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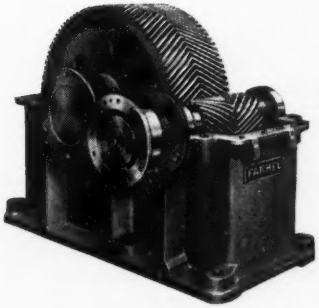


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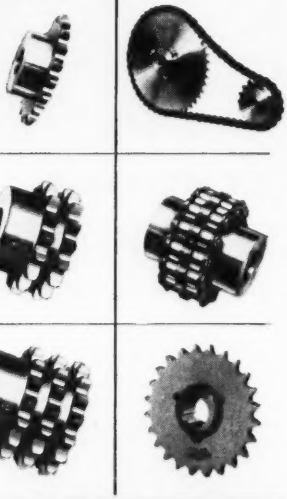
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FB-802

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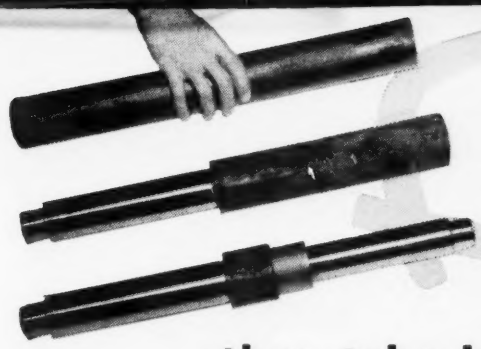
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power transmission
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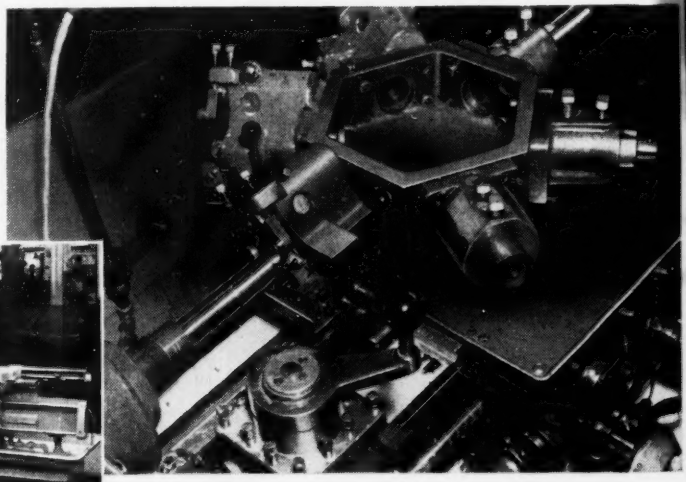


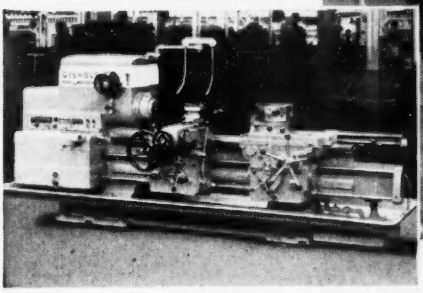
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SUPERFINISHERS . BALANCERS
SPECIAL MACHINES

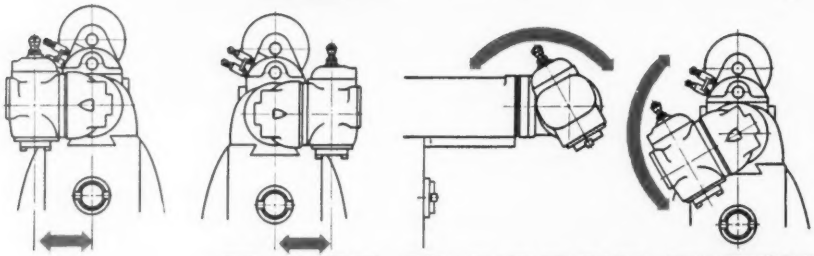
GISHOLT MACHINE COMPANY

MADISON 10, WISCONSIN

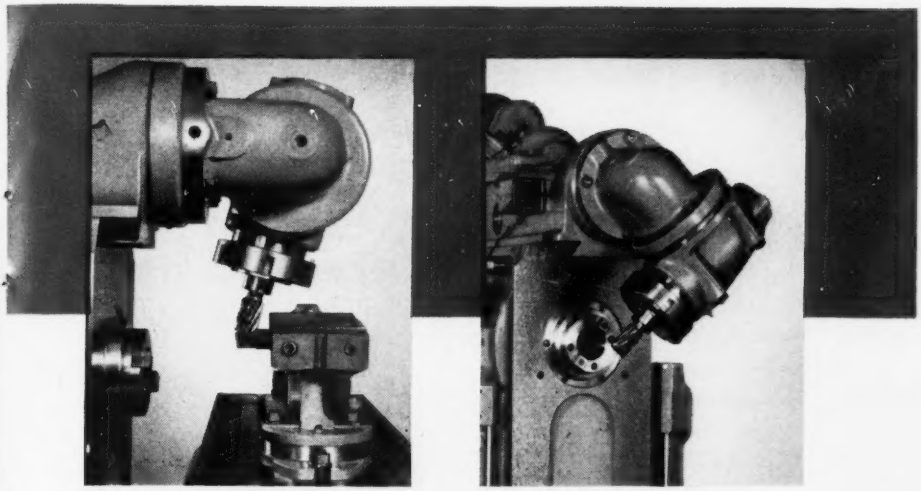


Increasing *with Cincinnati*

← CINCINNATI No. 2MI Plain Milling Machine, equipped with Motor Driven Universal Milling Overarm Attachment. A 36-page catalog, No. M-1662-2, gives you complete details of CINCINNATI Nos. 2ML and 2MI Milling Machines. Write for a copy.



CINCINNATI



the job possibilities

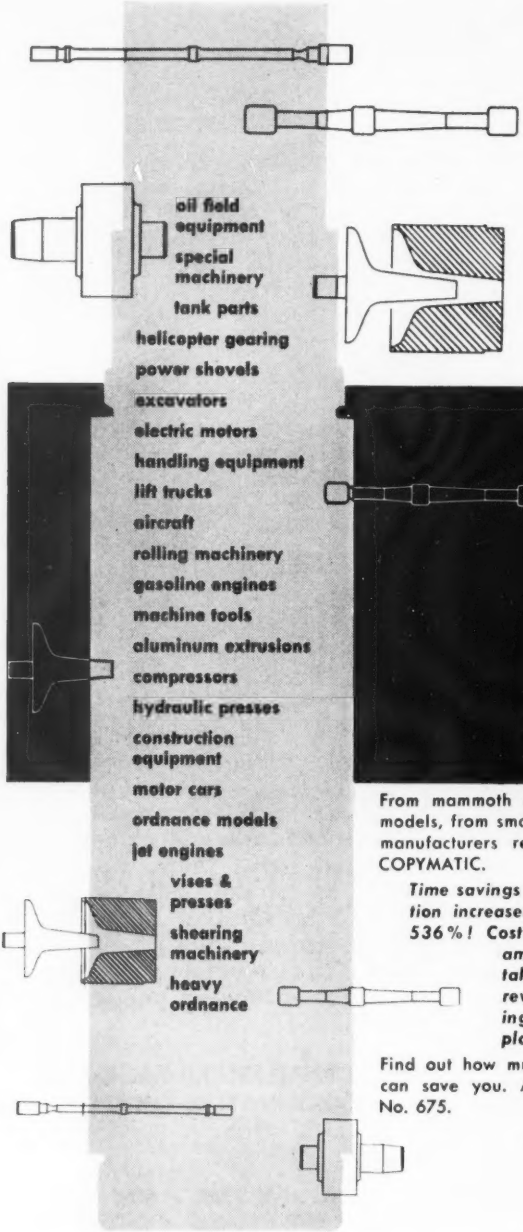
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Motor Driven Overarm Attachment

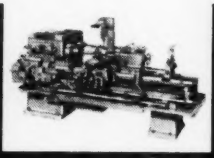
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The collector element is mounted on the side of the machine. Quickly cleaned, requiring no refills.

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A simple needle valve operates the unit, and can be shut off when machine is not in use.

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"SALVAGE INDUSTRIAL DIAMONDS FOR DEFENSE"*

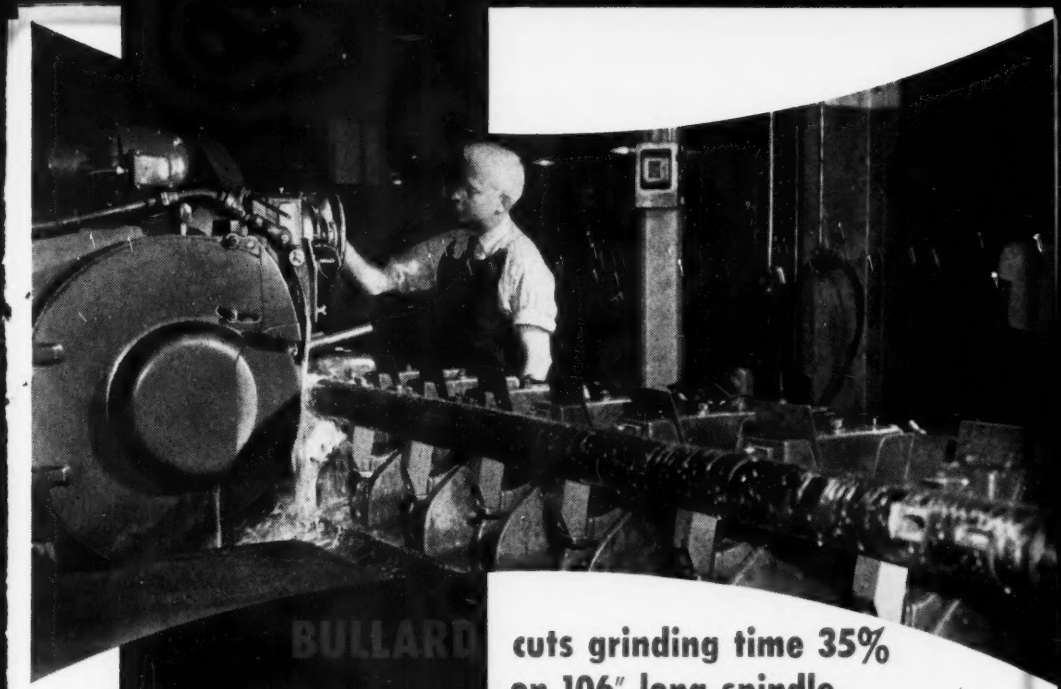
*That is the title of the National Production Authority's booklet which describes the growing critical shortage of industrial diamond supplies.

The shortage will soon result in idle machine tools, and lost defense production unless we straightway begin to conserve grinding wheels and salvage diamond dust. The N.P.A. fully and helpfully explains the methods for doing these things.

Request this N.P.A. booklet on your letterhead and Vulcan will be glad to send it to you. You will also receive literature on the versatile Vulcanaire Dust Collector which promotes health in your plant and turns dust into money.

It's made by the makers of Vulcanaire
The jig grinding attachment

VULCAN TOOL CO. PRITZ AND HIGHLAND
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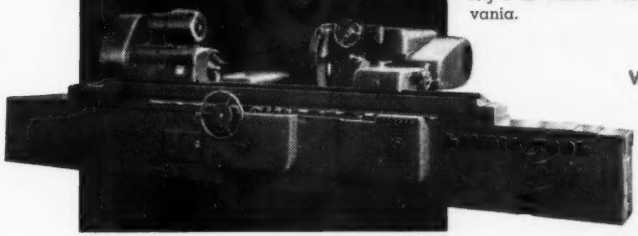
cuts grinding time 35% on 106" long spindle

Modern Landis Plain Grinder takes heavier cut than possible on old equipment

Two keyways in this long Nitralloy spindle for the Bullard Horizontal Boring Machine help make this a tough grinding job.

Seven work rests are used to maintain straightness and roundness to the .0002" tolerance. Filler blocks are used in the keyways at each work rest.

Production gains like this can be made on your grinding operations with modern Landis Grinders. Write for Catalog F-48. Landis Tool Company, Waynesboro, Pennsylvania.



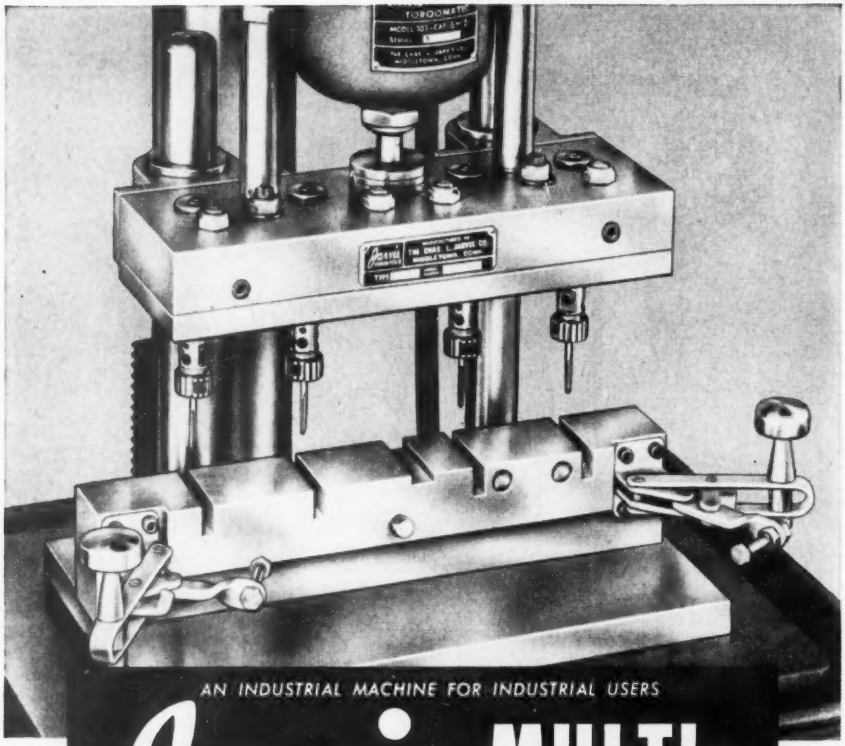
144 A9

Work Data

Machine	Landis 20" x 144" Type F Plain Grinder
Material	Nitralloy—4" diameter x 106" long
Stock Removal	.030" on diameter
Tolerance	.0002" for roundness and size
Production	7 hours grinding time

LANDIS

precision grinders



AN INDUSTRIAL MACHINE FOR INDUSTRIAL USERS

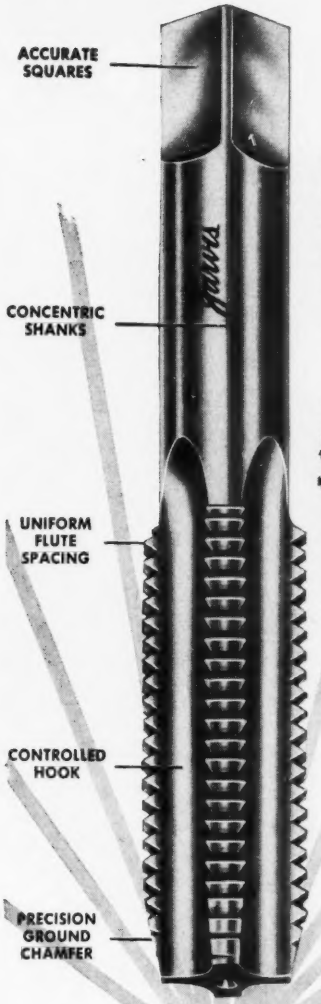
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for MULTI-TAPPING AND DRILLING

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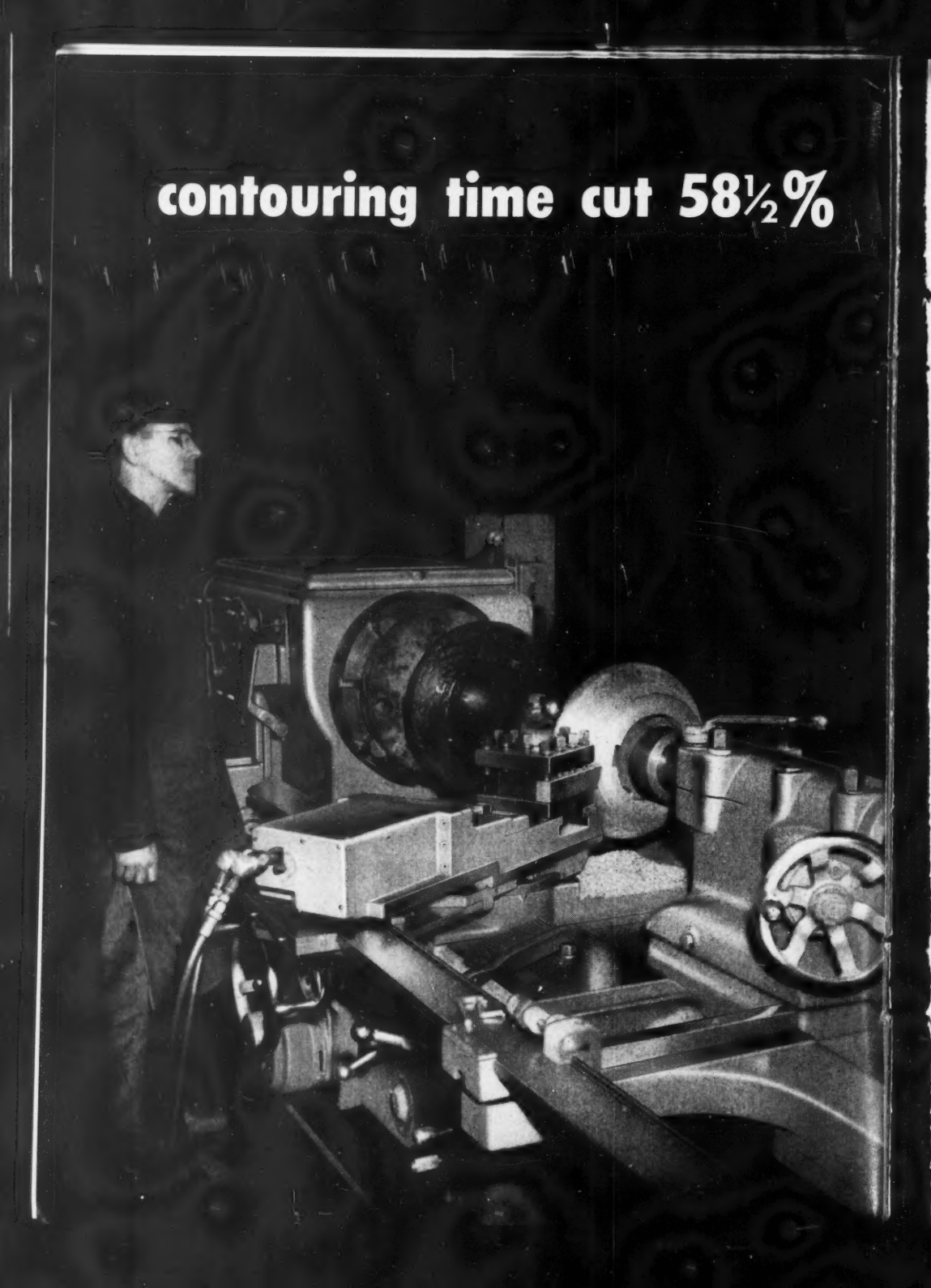
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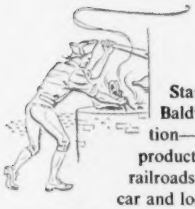
THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT

contouring time cut 58½%



with LeBlond Hydra-Trace

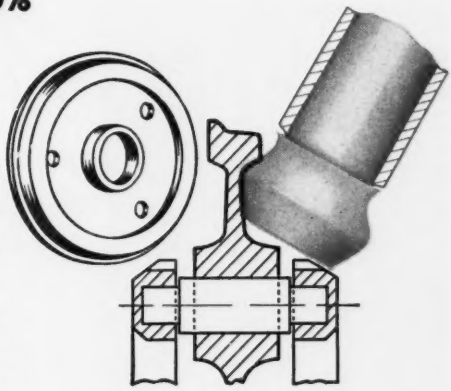
wheel mill roll life boosted 50%



Standard Steel Works Division of Baldwin-Lima-Hamilton Corporation—whose forges first flamed into production in 1795—supplies America's railroads with one-piece, wrought steel car and locomotive wheels. And Standard Steel officials credit LeBlond Hydra-Trace for contributing to their outstanding success in producing these wheels at competitive cost in the quantities needed.

At Standard's Burnham, Pennsylvania Works, rolls of alloy steel are turned to contour and then put to work shaping wheels. The intense pressure and heat of this hot-rolling operation soon work-hardens and wears the rolls out of contour. Formerly a skilled operator—tediously matching contours with a hand-held template—redressed the rolls manually. Four dressings were considered long service for a roll . . . and the work-hardened surface quickly dulled carbide turning tools.

Now, with Hydra-Trace installed on a 25″ LeBlond Heavy Duty Lathe, Standard Steel chalks up big savings under all three headings—man hours, material and tool life. As Marty Gotwalt of Swind Machinery—LeBlond's Philadelphia distributor—puts it, "Hydra-Trace automatically keeps the tool just under the work-hardened skin. We've lopped 14 hours off what used to be a 24 hour job."



And that's not all. Minimum metal-removal by the Hydra-Trace method frequently saves Standard's wheel mill rolls for six dressings—*a bonus of two over the manual method.*

Whether your turning problems—like the wheel mill rolls at Standard Steel—center in the toolroom or demand stepped-up output on the production line, Hydra-Trace is ready to help. For all LeBlond Heavy Duty Lathes built since 1935, this template-controlled, hydraulically powered tracer can be mounted in minutes. Templates are flat, compact, and suitable for both rough and finish turning. Call your LeBlond distributor or write

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

Ask for Bulletin HT-2-J for complete details on LeBlond Hydra-Trace

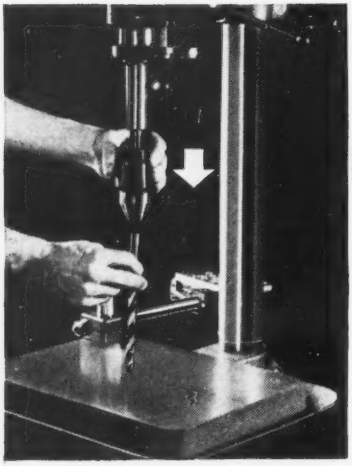
turned faster by

LEBLOND *of Cincinnati*

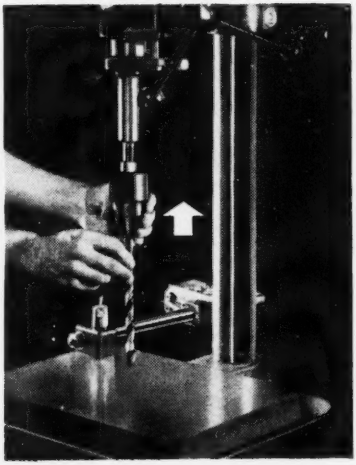
WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • *FOR MORE THAN 64 YEARS*

Change tools *in seconds* with this FULLY-AUTOMATIC CHUCK

no keys . . . collets . . . or wrenches



SPINDLE NEVER STOPS



HERE'S ALL THERE IS TO CHANGING TOOLS

TO OPEN—Grip Sleeve—pull down—jaws open automatically—tool is released.

TO CLOSE—Insert new tool—grip tapered part firmly—tool is locked in place.

SAVE TIME — Change tools with spindle running . . . no keys, collets or wrenches needed. Ideal for fast, uninterrupted production.

SAVE MONEY — One spindle does the work of several. Smooth, hardened and ground jaws grip tight without chewing tools. Grip increases with load.

IDEAL FOR — Precision drilling or for spotting, drilling and reaming in boring or milling machines; in lathe work for burring, turning and filing.

Available in two capacity ranges, 1/64" to 3/8" and 1/32" to 1/2".

Order from **your local industrial supply distributor** and write for illustrated folder to:
Wahlstrom/Float-Lock Dept., American Machine & Foundry Co., 511 Fifth Ave., New York 17, N. Y.

WAHLSTROM®
CHUCKS AND TAPPING ATTACHMENTS
FULLY-AUTOMATIC


HANDLE TOUGH JOBS EASILY
with
ROCKFORD HYDRAULIC SLOTTERS
ROCKFORD
Rockford Hydraulic Slotters are your easiest method of machining large irregular pieces, internal surfaces, and angular or rotary cuts.
Rockford Slotters sharply reduce cutting time on your cumbersome jobs. Setups are quick and simple. Hydraulic cross, circular and longitudinal feeds give you maximum slotter flexibility. And Hydraulic drive supplies constant speed, simply selected.
Ask a Rockford Machine Tool Co. representative to recommend the Rockford Slotter for your needs.
Hy-Draulic
ROCKFORD MACHINE TOOL CO.
2500 KISHWAUKEE STREET • ROCKFORD, ILLINOIS

Introducing

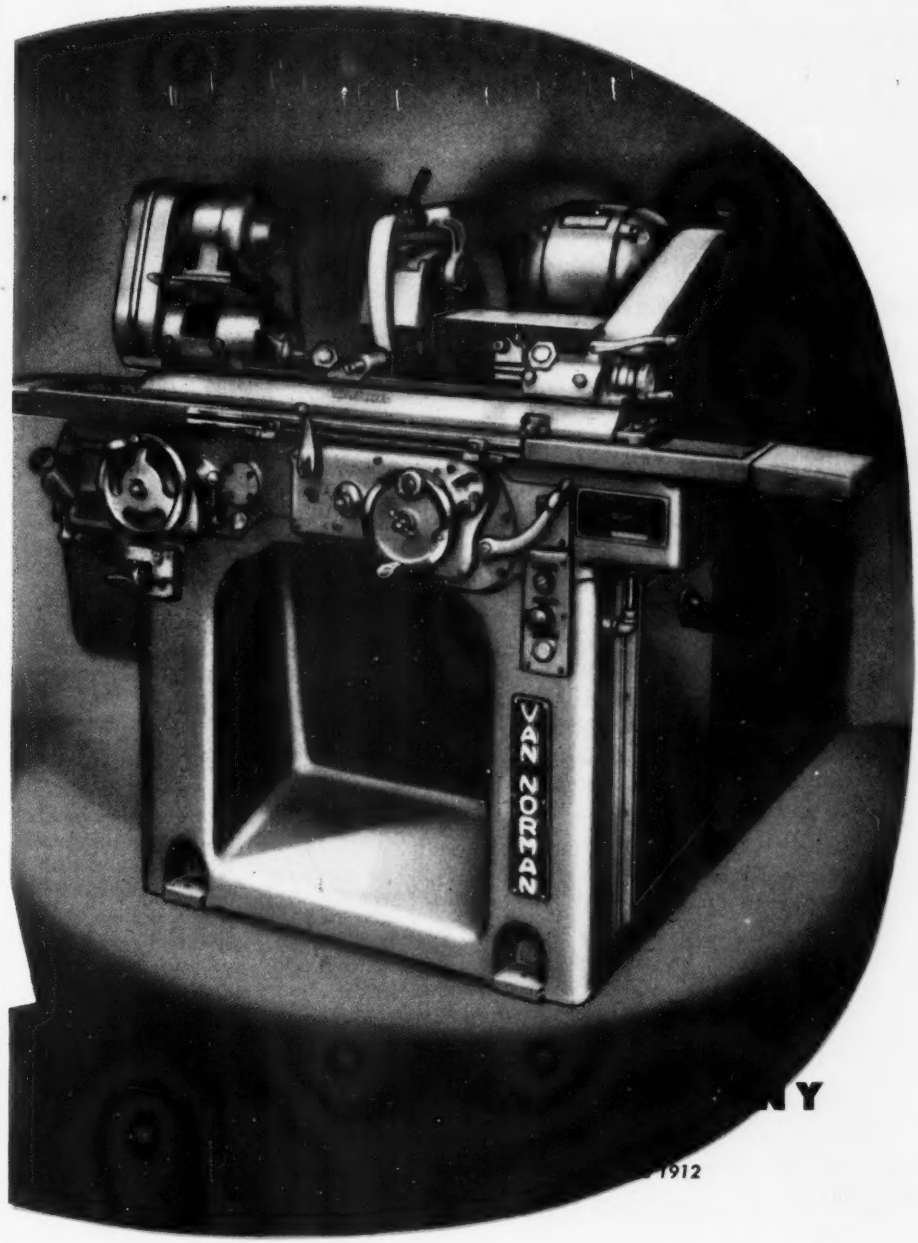
The New Revolutionary
VAN NORMAN
418 CYLINDRICAL GRINDER

Since 1912, Van Norman has pioneered in the design and development of precision grinders. *Now* Van Norman brings you the new, outstanding 418 Cylindrical Grinder for fast, economical "close-tolerance" grinding of small parts. And at an unbelievably low price.

QUICK FACTS

- Easily and conveniently operated
- Controls located and grouped for maximum operator efficiency
- Minimum floor space needed, only 43½" x 79¼"
- Grinding wheel speeds 1772 and 2067 RPM
- Wheel spindle, slide and slide base well proportioned and constructed for rigidity and maximum accuracy
- Headstock work speeds 153 to 940 RPM
- Maximum grinding diameter 4"
- Automatic lubrication

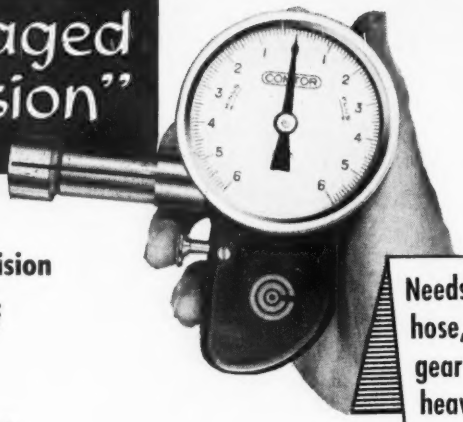
WRITE FOR COMPLETE DETAILS TODAY. ESPECIALLY INQUIRE ABOUT THE PRICE. IT'S EXCEPTIONALLY LOW.



Y

1912

"Packaged Precision"

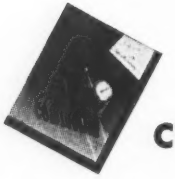


Measures high-precision holes to fractions of .0001", with these advantages ---

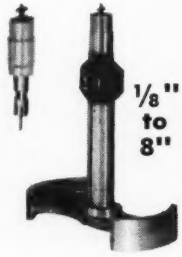
Needs no wires hose, electronic gear or heavy base

Here in a compact self-contained unit, you have the high precision that has found so prominent a place in the jet engine program. By unique design, Comtorplug gives true 2-point gaging, self-aligned and centered. Thus it enables you to check any part of a hole—including very bottom—detecting out-of-round, front or back taper, bell mouth, etc.

- There are no gimmicks to get out of order, such as wiring, hose or electronic gear. And because self-contained Comtorplug has none of these, and no heavy base, it is instantly usable anywhere: machine, bench, or lab.
- Shows actual measurement to fraction of .0001", and is "just right" for Statistical Quality Control programs.
- No skill needed to use it accurately—built-in features and 10 minutes' instruction do the trick.
- Marvelous thing about Comtorplug from production man's viewpoint is that you can put it to work in your shop without any planning, wiring, air lines or rigmarole—just a simple briefing on its use.
- Comtorplug is a rugged, shock-proof instrument. Use it for size control at the machine as well as bench inspection, wherever you produce precision holes in volume.



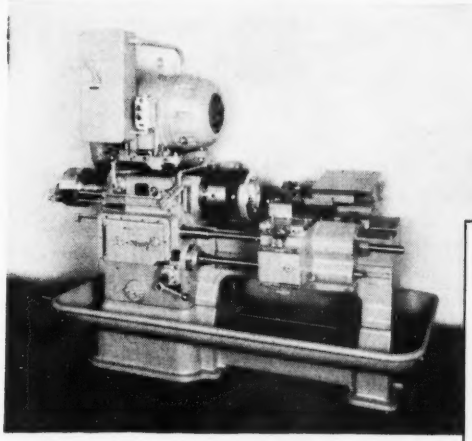
REQUEST BULLETIN 46



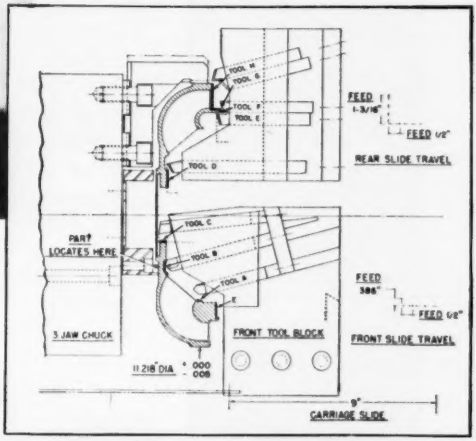
COMTOR CO. 64 FARWELL STREET WALTHAM 54, MASS.

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK



Lo-swing LATHE MACHINES TORQUE CONVERTER COUPLING AUTOMATICALLY



Problem: To bore, turn and face several dimensions on aluminum torque converter couplings.

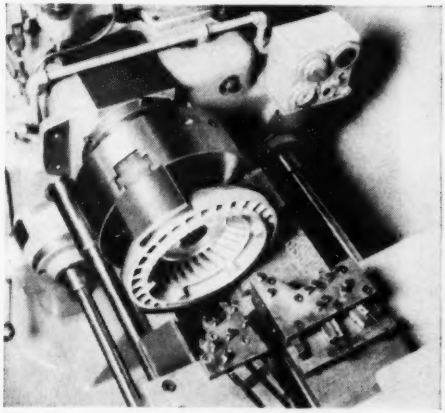
Solution: The Model LR Automatic Lo-swing Lathe was selected for this job and special tooling developed to enable all dimensions to be machined in one chucking. The work is held in an air-operated, three-jaw chuck fitted with mushroom type jaws to prevent distortion of the casting.

Carbide cutting tools are mounted on the front and rear slides as illustrated. Both front and rear slides have cross and longitudinal movements permitting either boring or turning operations combined with facing operations. All tools cut simultaneously and the entire sequence of operation is automatic.

The line drawing above shows the tooling layout and identifies the surfaces finished by each individual tool. A production of 60 pieces per hour at 80% efficiency is maintained.

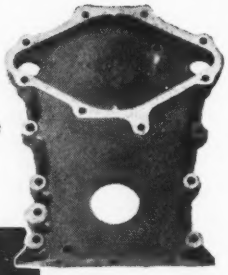
Let Seneca Falls engineers assist in solving your automatic turning problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.



PRODUCTION COSTS ARE LOWER WITH *Lo-swing*

what's your time estimate on this job?



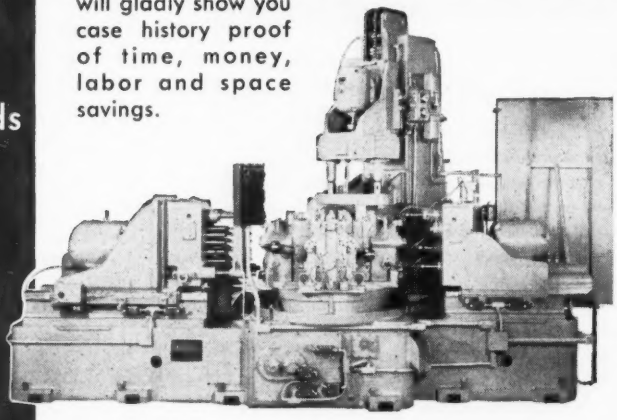
DRILL	19	HOLES
ROUGH BORE	2	HOLES
FINISH BORE	1	HOLE
CHAMFER	7	HOLES
REAM	1	HOLE
TAP	6	HOLES

Morris MOR-SPEED

Finishes One Part Every 33 Seconds

Machining a front cylinder cover for a popular make automobile engine, this four-way MORRIS Machine performs a two-cycle operation, and is production rated at 110 parts per hour at 100% efficiency. A total of 34 spindles do the operations listed above.

If your work requires numerous drilling, reaming, tapping and boring operations on a mass production basis, consult MORRIS Engineers. They will gladly show you case history proof of time, money, labor and space savings.



"A Better Product at Less Cost with PRECISION PLUS PRODUCTION."

Morris

THE MORRIS MACHINE TOOL COMPANY
934 HARRIET STREET CINCINNATI 3, OHIO

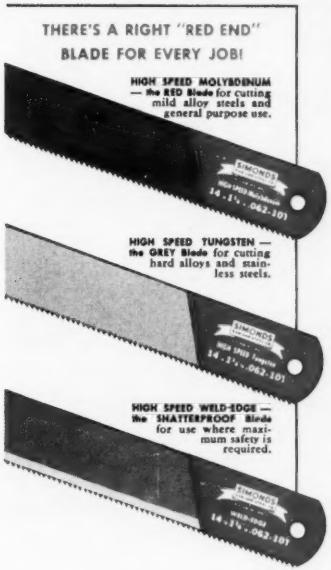


. . . you can count on it in every

SIMONDS

"Red End"

Power Hack Saw Blade



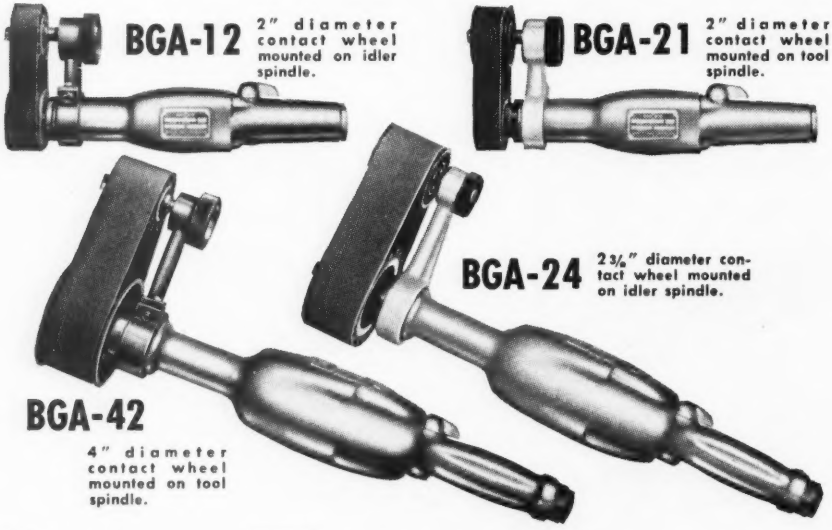
It's the *plus* you get in "Red End" Blades that makes the difference in overall performance, cutting life and dependability . . . a *plus* that starts with Simonds extra tough Hack Saw Steel, poured and rolled in Simonds own steel mill . . . followed by proven know-how in milling and setting the teeth and in heat-treating for uniform hardness and toughness of every blade. A choice of three types of job-designed blades in all standard sizes is another *plus* that pays off in extra cut-ability and lower hack saw costs for you. Get delivery from stock from your Industrial Supply Distributor.

SIMONDS
SAW AND STEEL CO.
FITCHBURG, MASS.

Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon. Canadian Factory in Montreal, Que. Simonds Divisions: Simonds Steel Mill, Lockport, N. Y., Simonds Abrasive Co., Phila., Pa. and Arvida, Que., Canada

TWO NEW BUCKEYE
Belt Grinding Attachments
FOR CLOSE QUARTER WORK

Now—you can save up to 50% on grinding costs, even on close quarter work where every inch of free space counts! These two NEW Buckeye Belt Grinding Attachments are specifically designed for grinding on concave contours and confined areas. The BGA-12 and BGA-24 models provide the same economy, efficiency and fine finish as the standard BGA-21 and BGA-42 models, PLUS extra maneuverability for working in close quarters. Choose now from four models . . . select the Buckeye BGA that meets your grinding requirements.



Buckeye Tools
CORPORATION

DIVISION 17 • DAYTON 1, OHIO

IN CANADA: Joy Manufacturing Co. (Canada) Ltd., Galt, Ontario

What are you waiting for?

In just two minutes, you can write for Bulletin S-13 and get complete information on all four models, any one of which can help you cut production time and costs.

PORTABLE AIR AND ELECTRIC TOOLS FOR INDUSTRY

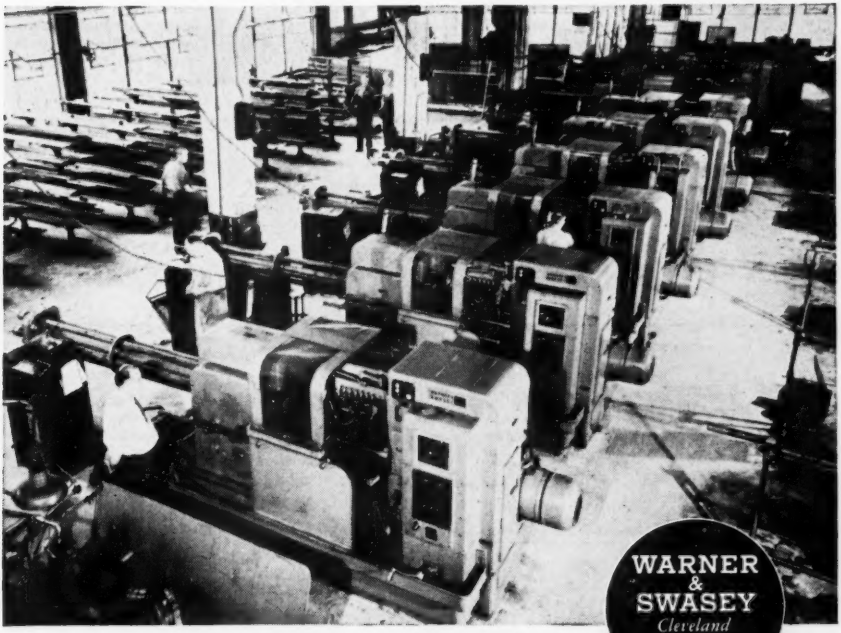
Modernization pays off!

6 MACHINES NOW DO THE WORK OF 17

AS PART of their modernization program, Otis Elevator Company replaced 17 machines with 6 Warner & Swasey 5-spindle Automatics. These automatics are used at Otis for short runs on specially-machined parts—studs, bolts, nuts and other screw machine products—required for custom-made elevators.

The results of this modernization program: increased production in less floor space, more uniform parts, and six critically needed men released for work elsewhere in the plant. At Otis only 3 men are required to set up and operate these 6 automatics.

Because of its quick setup and ease of operation, the Warner & Swasey 5-spindle Automatic makes automatic production economical on short runs as well as large lots. It's a machine designed to meet the requirements for lasting accuracy and increased production for the years ahead.



The Warner & Swasey 5-Spindle Automatic line at the Yonkers Works of the Otis Elevator Company.

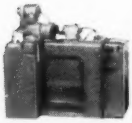
YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

bryant
internal grinding



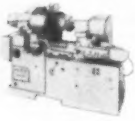
no. 1309-W

Finishes 2 bores and a taper straight and concentric. 2 wheelheads are used on this semi-automatic. Max. traverse stroke, 6". Max. grinding length, 3½".



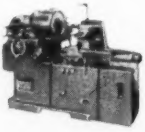
no. 1109

For high production of small bores where accuracy of size and finish are required. Max. traverse stroke, 6". Max. grinding length, 3½".



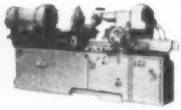
no. 1316

Two wheelheads for high production of jobs requiring face and bore, or face and O.D. grinding. Max. traverse stroke, 20". Max. grinding length, 8".



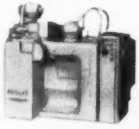
no. 1116

A general purpose hole grinder for tool room, small shop, or general production. Maximum traverse stroke, 20". Maximum grinding length, 8".



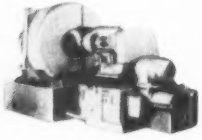
no. 1416

Specially designed for grinding bores in long work, such as machine tool spindles. Maximum traverse stroke, 20". Maximum grinding length, 8".



no. 1209

A fully automatic, high production machine for small and medium bore grinding. Max. traverse stroke, 6". Max. grinding length, 3".



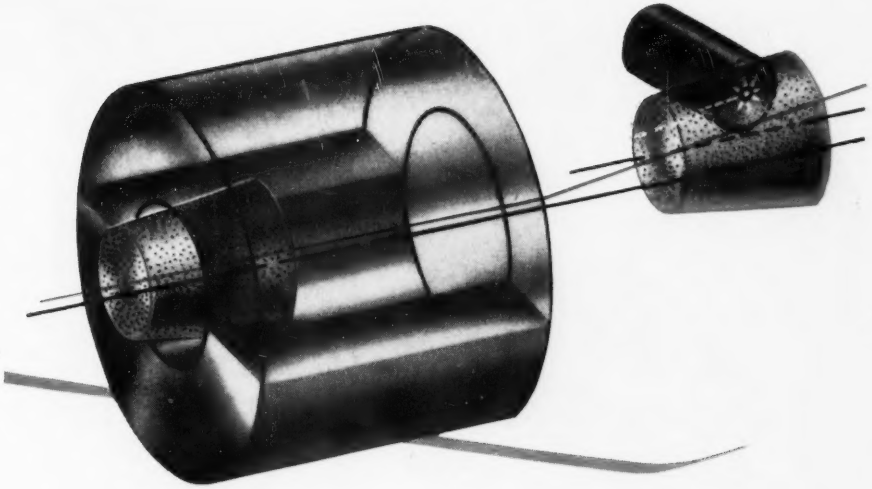
no. 1460

For production or single piece hole grinding on parts up to 60" diameter. Max. traverse stroke, 21". Max. grinding length, 16".



no. 2209

For precision and high production grinding of ball bearing races, gears, rolls, bushings, etc. Max. traverse stroke, 6". Max. grinding length, ¾".



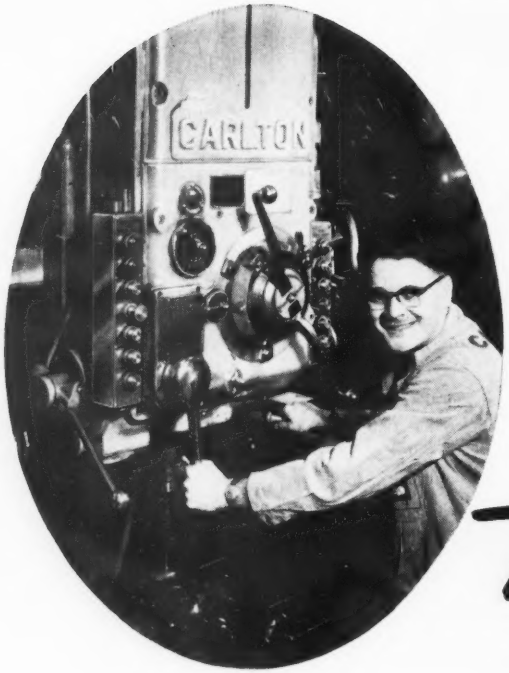
IT is common assumption in internal grinding that once the grinding wheel passes the diamond, all errors will be eliminated and the wheel will be a perfect cylinder. It is also assumed that this grinding wheel can produce a straight hole. These two assumptions are true if the wheel path is a straight line parallel with the axis of the wheel as it passes the diamond and traverses the work.

In the illustration, the wheel slides are badly worn and the wheel path is not a straight line. The distortion in the ways causes the wheel to move gradually away from the diamond and the wheel is dressed to a taper as it passes the diamond. Then, as the tapered wheel traverses the work, it will grind only on its large diameter. At the point of reversal the tapered form will be transferred to the work. If the traverse stroke is lengthened, the tapered section will be moved to the new point of reversal. In addition, wheel wear will be excessive, finish will be poor, feed lines may be visible.

Available information advises simply turning the workhead or changing the length of traverse to correct taper. In the case illustrated, neither turning the workhead nor changing the length of traverse will produce a straight hole. The only possible remedy is to straighten the wheel slide ways which will, in turn, straighten the wheel path. The wheel will then contact the work properly, producing correct geometry of the hole, longer wheel life and better finish.

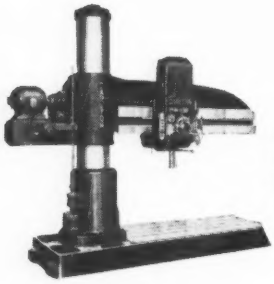
Bryant Chucking Grinder Company
Springfield, Vermont, U. S. A.

Internal grinders • Internal & External thread gages



look, fellas, Two hands!

YES, YOU CAN USE BOTH HANDS WHEN YOU RUN A CARLTON RADIAL DRILL . . . THAT'S THE NATURAL, EFFICIENT PROFITABLE WAY . . . WITH CONTROLS ARRANGED IN LOGICAL, CONVENIENT ORDER ON BOTH SIDES OF THE HEAD . . . CARLTON RADIAL DRILL OPERATORS ACTUALLY DEVELOP "TOUCH SYSTEMS" THAT SAVE TIME AND EFFORT.



You should know more about this ease of operation . . . and the other reasons why Carlton radial drills are frequently able to double hole production. So send today for your descriptive bulletins . . . see how you can make and save money when your operator gets his hands – both hands on that new Carlton.

Only one can be called the finest

Carlton

THE CARLTON MACHINE TOOL CO., CINCINNATI 25, OHIO

talk about MULTI-PURPOSE

this KLING is really the "jack-of-all-jobs"



KLING
COMBINATION SHEAR, PUNCH AND COPER

When you were a boy, your ambition was to have one of those jack-knives with over a half-a-dozen blades that would do everything. Right now, wouldn't you like to have such an all-purpose machine in your shop?

Here it is! The Kling Combination Shear, Punch and Coper that handles all the different operations shown above and many more. One of these Kling Machines in your shop can turn out the work of a separate punch, angle shear, bar shear, plate shear or notcher—and yet it costs only a few dollars more than a single-purpose punch.

Available in 3 sizes for light, medium or heavy work; all ruggedly built, and all meeting machine tool precision standards.

SEND FOR FREE BULLETIN that gives you complete details of all the jobs this machine can do; full technical data and specifications. Ask for Bulletin 347. Kling Bros. Engineering Works, 1328 North Kostner Avenue, Chicago 51, Illinois.

Kling ***...an investment in speed!***



5879MWR

DISSTON®

METAL-CUTTING TOOLS

greatest cost-cutting team you can buy!



FILES

HACK SAW BLADES



METAL-CUTTING BAND SAWS

DISSTON FILES—a complete line—rugged, long-lived, economical. Exclusive *Bite-Rite*® American Pattern files, versatile *Multi-Metal*® files, precision-made *Superfine*® Swiss Pattern files.

DISSTON HACK SAW BLADES—made from four special-purpose steels: High Speed Steel blades, for cutting metals ordinary steel can't cut (hand or machine use). Di-Mol Blades, for general production (hand or machine use). Chromol (all hard) Hand Blades, and Duraflex (flexible) Hand Blades for general use.

DISSTON METAL-CUTTING BAND SAWS—for full-speed production. Uniform hardness and temper, durable edges. Made in both Hard-Edge, Flexible-Back and Hardened Throughout styles.

HENRY DISSTON & SONS, INC.
221 Tacony, Philadelphia 35, Pa., U. S. A.
Canadian Factory: 2-20 Fraser Ave., Toronto 3, Ont.

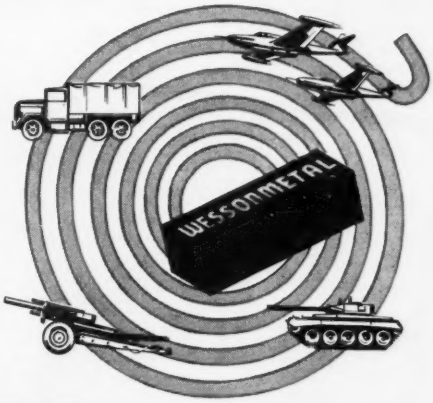
For prompt service, export advice, reliability, many economies
SEE YOUR DISSTON DISTRIBUTOR

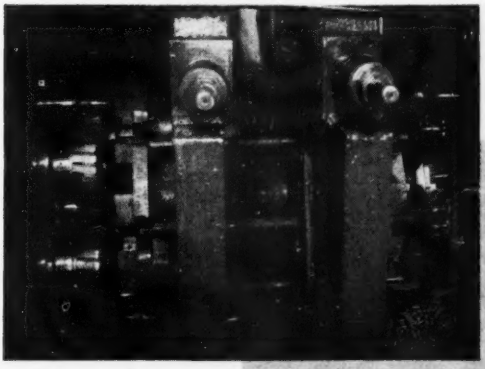
WESSONMETAL . . . The Carbide for Top Production

WESSONMETAL

MAINSPRING of PRODUCTION!

IN EVERY PHASE OF METAL MACHINING IN INDUSTRY TODAY





HERE'S AN OUTSTANDING EXAMPLE IN THE AUTOMOTIVE INDUSTRY



ACTUAL JOB	AUTOMOTIVE PLANT
Machine	Davis Thompson Milling Machine
Part	Rear axle shaft
Operation	Rough and finish mill spline end
Material	S.A.E. 1038—Brinell Hardness 179-229
Tools	Wesson 6" and 8" dia. Milling Cutters—fine pitch—kraze type
Speed	8"—387 S.F.M. 6"—290 S.F.M.
Feed	14" per min.
	Feed per tooth 8" dia. (28 tooth) .0021
	Feed per tooth 6" dia. (20 tooth) .0030
Production	150 pcs. per hour, 1500-1700 pcs. per grind
Grade of Carbide	Wessonmetal WM



Write for . . . the story of Carbide

THIS CARBIDE AGE

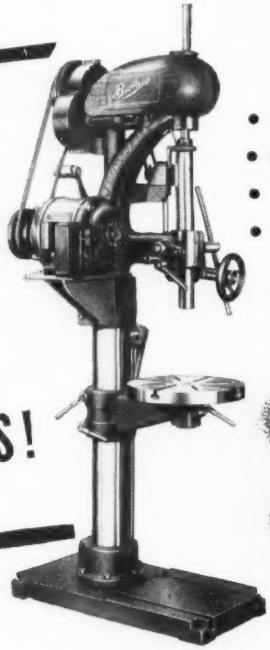
WESSON METAL CORPORATION
LEXINGTON, KENTUCKY
Affiliated with WESSON COMPANY, Detroit, Mich.

WESSONMETAL
Cemented Carbide

"Buffalo" Tips on Better DRILLING

"Buffalo"

NO. 21 JACK OF ALL TRADES!



For —
- Structural Shops
- Sheet Metal Fabrication
- Maintenance Shops
- Garage & Repair Shops

An Over-All Service Tool!

This rugged 21-inch drill is really a jack-of-all trades for all kinds of job drilling! It's big, husky, well-made. Has direct and back-gearing, eight speeds. Big 27" space between spindle nose and table.

If you're looking for a reliable drilling machine for general work of all kinds—you'll buy the "Buffalo" 21.

Write for prices.

"Buffalo" MACHINE TOOLS

DIAMOND JUBILEE 75th ANNIVERSARY

BUFFALO FORGE COMPANY

388 BROADWAY BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

DRILLING PUNCHING SHEARING CUTTING BENDING

"MARVEL" HAS always had the edge



MARVEL High-Speed-Edge Blades assure Faster, more Accurate cutting with proven Economy and complete Safety. Only the MARVEL is a composite blade with a high speed steel cutting edge electrically welded to an exceptionally tough, strong alloy steel body.

The High-Speed-Edge does the cutting while the alloy back with hardened eyes, carries the load. Blade tensions up to 300% higher than those possible with ordinary blades are recommended. This greater tension is confined to the cutting or leading edge by the location of pin holes (exclusive MARVEL design feature) and cannot be overcome by work resistance. Heavier feeds and greater speeds are practical without "run out."

With greater accuracy, higher production and lower cost per cut, come the extra dividend of Safety, for MARVEL High-Speed-Edge Hack Saw Blades are Positively Unbreakable—*they will not shatter.*

Ask your local MARVEL distributor (see classified phone book) to help you modernize your metal sawing with MARVEL High-Speed-Edge Blades. They cost no more than ordinary high speed steel blades.

1. High Speed Steel cutting edge.

2. Tough unbreakable alloy steel body with hardened eyes.

1. & 2. Integrally welded to make a fast-cutting, long lasting composite blade that is positively unbreakable.

ARMSTRONG-BLUM MFG. COMPANY

"The Hack Saw People"

5700 BLOOMINGDALE AVENUE **CHICAGO 39, ILLINOIS**

MARVEL *Metal Cutting* SAWS

Better Machines–Better Blades



Here's another reason it pays to get a proposal from Fosdick

We check flatness to 40 millionths

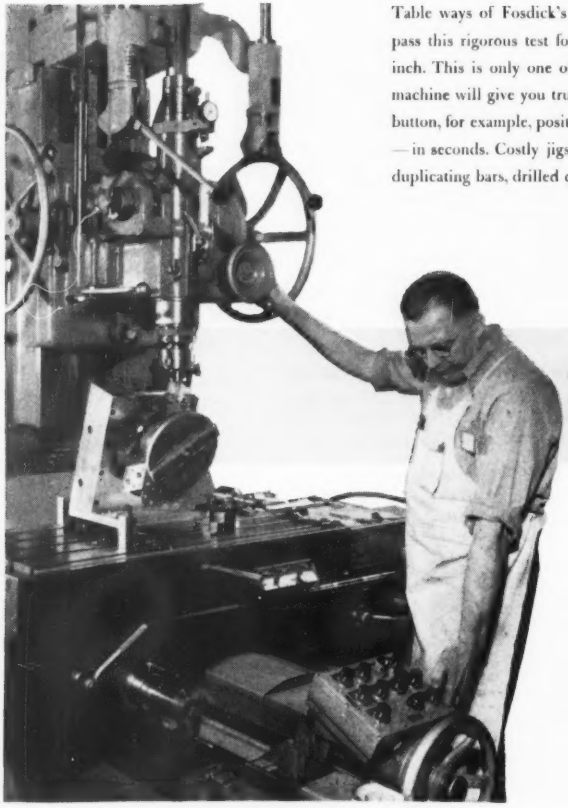


Table ways of Fosdick's Automatic Positioning Machine must pass this rigorous test for flatness—within 40 millionths of an inch. This is only one of many tests we run to make sure this machine will give you true precision production. The touch of a button, for example, positions work for each new hole to ± .0001" —in seconds. Costly jigs have been replaced by two $\frac{5}{8}$" square duplicating bars, drilled quickly for the job, stored easily.

to give you

Boring Time "Nose Dives" at Fairchild.

Mass production of precision magnesium housings for commercial and military cabin pressurizers at Fairchild Engine and Airplane Corp. demanded speed and high accuracy. Fosdick's proposal recommended Automatic Positioning Machines. Now Fairchild drills, faces and bores $\frac{31}{32}$" holes with accuracy to ± .0001"—*has slashed boring time 40% over former methods.*



For full description of the Automatic Positioning Machine ask for Bulletin APS.

precision production like this

Need Drilling Equipment? Get a Proposal from Fosdick!



FOSDICK

THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO

SHOP TIPS

New, Free Magnet Idea Kit for Shops



A handy new literature kit showing the hows and whys of permanent magnets is currently sparking shop men to real savings in time, money, effort.

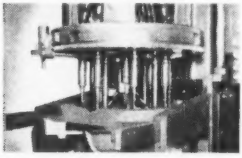
To date, the magnets have proved very effective as sheet steel separators, magnetic stands, tool-holding devices, sweepers' "pickup" tools, paper grippers and tool retrievers, to name a few uses.

Magnet Idea Kit can be obtained free from Carboloy Department of General Electric Co. (See address at right.)

* * *

Drill Cast Iron with Carbide Twist Drills

Drilling cast iron with carbide twist drills is definitely past the "maybe" stage. Users report doubled production, more than tripled drill life over



H.S.S. drills, without any special drilling equipment or job engineering. Sound, how-to-do-it technical bulletins available free. Write Carboloy Department of General Electric Co. (See address at right.)

* * *

New Masonry Drills Won't Stall, Pack



An outstanding advance in rotary drilling of masonry was recently unveiled in Carboloy oval-flute "Live-Spiral" Drills.

The drills, tipped with Carboloy cemented carbide, won't stall or pack even at very rapid speeds. They work equally well in concrete, brick, plaster, slate or asphalt. For full details write Carboloy Department of General Electric Company. (See address at right.)



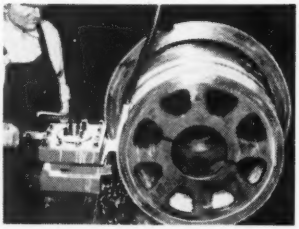
YOUR CARBOLOY FIELD ENGINEER SAYS—

We can help you get swift tool-

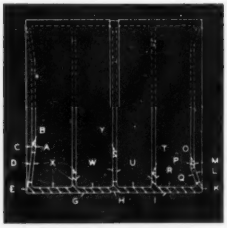
Here's how one leading manufacturer quickly adapts low-cost Standard Carboloy Tools to his single-point tool machining operations – jobs that would normally require costly "specials" – and gets them on the jobs *in minutes*. No special grinding equipment. No delays or heavy inventories. By standardizing on "Standards," he gets full carbide benefits shop-wide – just as you can. Check these pages. Then send me blueprints of your tough single-point tool jobs. We'll show you how easily "Standards" can be best for you, too.



1 Gets 14 "specials" from these 4 styles of "Standards" – A large Midwestern manufacturer (name on request) needed 14 specially shaped tools for a rush job on cast steel gear blanks. From their stocks they selected the 4 Standard Carboloy Tool styles shown . ground them to the shapes needed in minutes per tool. No long waits for costly "specials," no extra expense or production delays. (See illustrations, below and on right-hand page.)

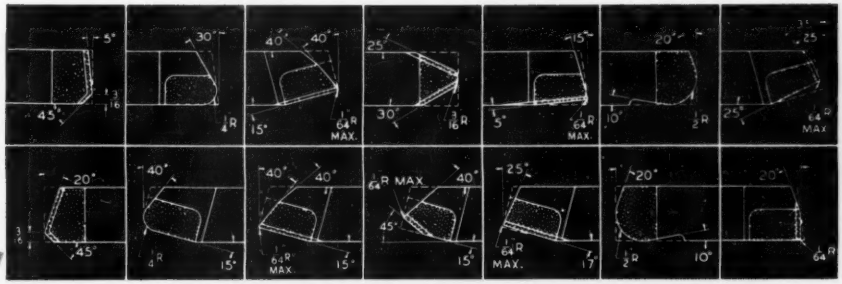


Here is the job – a tough steel casting 26" in dia., 28" wide, and requiring a wide variety of rough and finish turning, facing and boring operations.



Sketch of side view of part showing many of the single-point tool machining operations necessary for the job.

convert to Standard Carboloy Tools and ups, low inventories, lowest tool cost



Dotted lines show the original tip ends of the 4 styles of Standard Tools before they were ground to these 14 special shapes in minutes.

2 **Easy for you to use, also**—Adapting Standard Carboloy Tools to your special-tool needs is a cinch. They can be rough-ground quickly on ordinary silicon carbide wheels, finished economically on diamond wheels. Standard Carboloy Tools stay sharp up to 10 times as long as high-speed steel tools, last 10 times longer, too.

3 **You get quicker tool-ups** – You'll cut tooling delays to minutes instead of days or weeks with "Standards" on your shelves. Your inventories will be lower – costs, too. Just 11 styles of Standard Carboloy Tools can be adapted to do up to 80% of all your single-point tool machining.

4 **You enjoy plant-wide benefits** – Let us help you convert to standard styles of Carboloy Tools – for plant-wide benefits. Thousands of shops have done so . and now profit from such things as production gains of up to 300%, downtime savings that alone more than pay for the entire cost of the tools.



To get maximum performance from Standard Carboloy Tools, we have the industry's best all-around Carbide Service Program. Includes all types of free how-to-do-it technical data, a tuition-free training school, etc. For details, mail coupon today.

CARBOLOY TOOLS ARE STOCKED COAST TO COAST BY

AUTHORIZED CARBOLOY CEMENTED CARBIDE DISTRIBUTORS

Look under "Tools" in the Yellow Pages of your local telephone book, or in Thomas' Register, for address and phone number of your nearby Carboloy distributor, branch or district office.

"Carboloy" and "Live Spiral" are registered trademarks of Carboloy Department of General Electric Company

5 **Send blueprints of your "specials"** – Let us review your single-point tool machining jobs that now require costly special tools . . . show you exactly what "Standards" can be adapted, and how. Send blueprints today to the factory at Detroit, or to your nearest Carboloy District Office. No charge or obligation. See coupon below.



MAIL COUPON TODAY!

CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

11143 E. 8 Mile Ave., Detroit 32, Michigan

Gentlemen. Please send me, at no cost or obligation, Carboloy General Tool Catalog, GT-250.

☐ Also, I am enclosing ( ) blueprints or sketches of the single point tools we use. Show me, free of charge, which low cost Standard Carboloy Tools can be quickly ground to these special shapes (and how to do it).

Name _____ Position _____

Company Name _____

Address _____

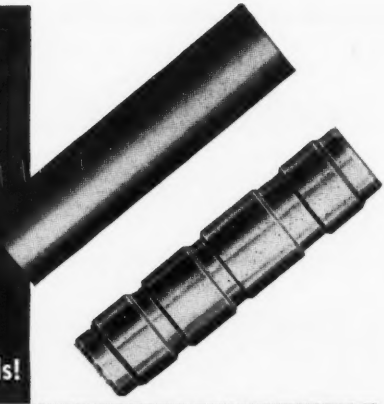
City _____ Zone ____ State _____

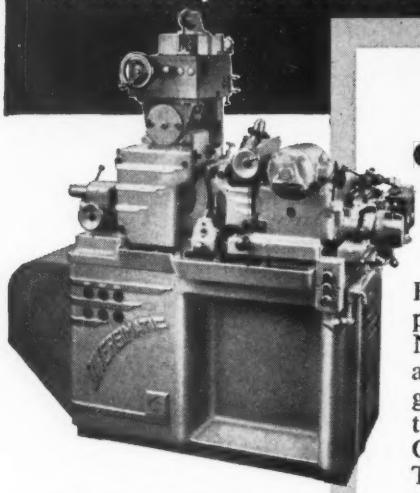
From blank to finished piece in *12 SECONDS*

with

DIVERSIMATIC

...20 minutes by conventional methods!





Get the facts on DIVERSIMATIC
The Centerless Grinder with
the spindle that needs no warm-up!



DIVERSIMATIC
with
CRUSH-FORMING ATTACHMENT

Centerless grinds small parts faster from the SOLID!

Here's the newest step to greater production... greater economy! Now, many small, formed parts and multi-diameters can be ground direct from the solid on the DIVERSIMATIC! The CRUSH FORMING ATTACHMENT dresses the wheel to desired contour and holds the form hundreds of pieces longer between wheel dressings, imparting the exact profile to the work. Also finish grinds rough-turned parts. Grinds faster, holds tolerance, cuts costs!

DIVERSIFIED METAL PRODUCTS CO.
2838 Leonis Boulevard • Los Angeles 58, California



The NEW VI-POWR

face milling cutter *takes all the drive you can give it!*

INCREASE PRODUCTION with this new VIKING CUTTER

TYPICAL CASE HISTORY:

Previous cutter — 65 pcs. per hour.

VI-POWR cutter — 210 pcs. per hour with improved micro-finish.

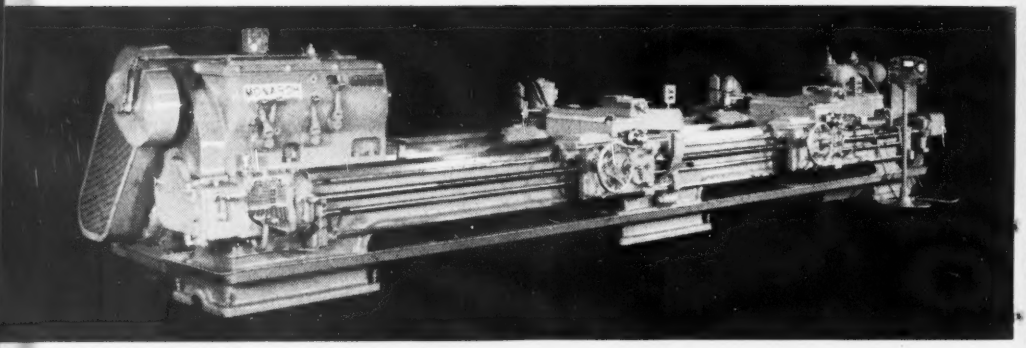
Name on request.

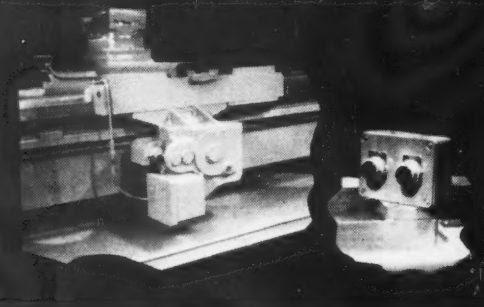
- **Fine pitch blades — more chips per revolution. Utilizes high feed rates without excessive tooth load or loss of surface finish.**
- **Serrated, full carbide, dual adjustable, inserted blades — positive locking, longer life, low replacement cost.**
- **Dual threaded screw and wedge lock simplifies blade adjustment and replacement. No hammering *blade or wedge* at any time.**
- **One size blade for wide range of cutters.**

VIKING TOOL COMPANY, INC.

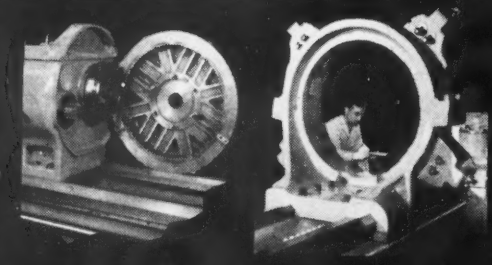
SHELTON, CONN.

INSERTED BLADE SINGLE POINT TOOLS AND MILLING CUTTERS





PLUS CONTROL. A smoothly functioning rapid traverse in either direction is furnished by unit mounted at rear of machine (left). Push button controls on front carriage wing (right) give instant response only when depressed. Standard on 25" Model N and 32" Model NN, optional on 20" Model M.



PLUS POWER. For heavy stock removal from large diameter work, the optional face plate drive headstock is a "must" (left). It insures full, even delivery of power under load. Drive may also be taken through spindle. Steady rests of great capacity and strength are provided. This one (right) will take work 36" to 38½" diameter.

Monarch 25" Model N with long bed. Note optional dual carriages —ideal for peak production on long shafts and gun barrels. Perfect performance is noted with two tools turning simultaneously. Air-Gage Tracer Controls can be supplied for both carriages (as shown), either carriage, or neither. Monarch-Keller controls can also be furnished.

BIG Monarchs



Powered like a Percheron



Nimble as a Pony

Imagine a great steel-muscled Percheron with the instant, spirited responsiveness of a polo pony—and you've got a picture of the Monarch Heavy Duty Lathes. Here are lathes with the size, power and rigidity to hog off heavy cuts from big work—yet built to provide high finish, close accuracy and convenience of operation! Witness the great number of them—both with and without Air-Gage Tracer controls—speeding production of critical jet aircraft parts today.

Here's unequaled strength and versatility within the capacities offered—20", 25" and 32" swings in standard lengths up to 324" between centers. Look at the special features and applications we've found space to illustrate here. Then write for our Booklet #1208—36 pages of data and pictures —for the complete Monarch Heavy Duty Lathe story. We'll send it gladly . . . . *The Monarch Machine Tool Company, Sidney, Ohio.*

Monarch
ACCURACY • ECONOMY • LONG LIFE
TURNING MACHINES

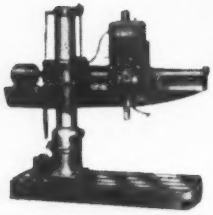
FOR A GOOD TURN FASTER—TURN TO MONARCH



PLUS SWING. For maintenance and repair work—for occasional big parts, light cuts on big diameters, and turning shafts with previously machined large sections, plus swing up to 60" and more can be provided. This Model SN, shown turning a paper machine drum, swings 84"

wide angle visibility really saves time





'Round the clock—day after day—time savings pile up with Gilbert radial "comfort-level" operation. The operator can put the arm down (for comfort as well as minimized deflection) and still have full view of the work because (1) the spindle is close to the arm and to the front face of the head and (2) the bottom of the head extends only a short distance below the lower vee of the arm. All controls are *right at hand*, easy to reach and finger-tip sensitive, keep fatigue *down*, production *up*.

WRITE FOR BULLETIN 349.

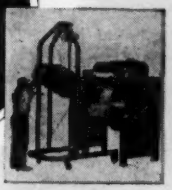
THE CINCINNATI
GILBERT
MACHINE TOOL COMPANY
3366 BEEKMAN STREET • CINCINNATI 23, OHIO

those who buy Gilbert buy Gilbert again

DIVISION OF ALMCO QUEEN STOVE WORKS, INC.

Supersheen SPEED FINISHING

ALBERT LEA, MINN.



The Greatest Finishing Story Ever Told!

NAME* Leading Automobile Mfgr.

SHIPMENTS

DATE	MODEL NO.	SERIAL
8/18/48	DB-8	1234

Initial Order 1 Unit—Re-ordered 27 units since original purchase

NAME* Large Gear & Ball Bearing Mfgr.

DATE	MODEL NO.	SERIAL
10/1/46	DB-2	1040

Initial Order 1 Unit—Re-ordered 25 units since original purchase

NAME* Leading Business Machine Mfgr.

SHIPMENTS

DATE	MODEL NO.	SERIAL
6/30/52	DB-200	443

Initial Order 1 Unit—Re-ordered 32 units since original purchase

NAME* Leading Appliance, Radio & T. V. Mfgr.

DATE	MODEL NO.	SERIAL
12/4/46	DB-8	1096

Initial Order 1 Unit—Re-ordered 36 units since original purchase

NAME* Large Chain & Sprocket Mfgr.

SHIPMENTS

DATE	MODEL NO.	SERIAL
7/28/51	DB-400	259
7/29/51	DB-400	260

Initial Order 2 Units—Re-ordered 24 units since original purchase

NAME* Leading Appliance & Electrical Equip. Mfgr.

DATE	MODEL NO.	SERIAL
1/5/48	DB-2	1172
1/5/48	DB-2	1173
1/5/48	DB-2	1174
1/5/48	DB-2	1175

Initial Order 4 Units—Re-ordered 74 units since original purchase

THESE CARDS FROM OUR FILES TELL THE STORY! Six years ago Almco Supersheen was a new name in the barrel finishing industry. Today it's the world's most complete and *largest selling* line of barrel finishing equipment and materials. Re-orders from large and small manufacturers have made this remarkable growth possible.

Almost all types of metal parts are now being deburred and finished at sensational cost savings with Supersheen Advanced Speed Finishing.

IN A REVIEW OF 10 TYPICAL ALMCO SUPERSHEEN INSTALLATIONS, finishing costs averaged 80.1% less than former methods—from 48% on a threaded cast iron pipe "T"—to a 95% savings on a steel trigger with intricate configurations.

The coupon below will bring you full information about equipment prices, processes and free services.

★ NAME ON REQUEST



FREE 22 PAGE BOOKLET

NEW REVISED EDITION

This 22-page booklet is guaranteed to open your eyes! The inside story of Advanced Barrel Finishing as never told before! Shows why Almco SUPERSHEEN Equipment pays for itself in as little as two months! A single-unit replaces from 2 to 12 men. Savings up to 95% on almost ALL types of parts with absolute uniformity, fewer rejects, finer finishes!

Send coupon today for your *FREE* copy.

ALMCO SUPERSHEEN
Dep't. K-2, Albert Lea, Minn.

Please send Free Booklet "Advanced Barrel Finishing" equipment catalog, and details about your Free Sample Processing and Free Engineering Service.

Name _____ Title _____

Address _____

City _____ State _____

ALMCO Supersheen SPEED FINISHING

WORLD'S LARGEST SELLING LINE OF BARREL FINISHING EQUIPMENT—MATERIALS AND COMPOUNDS, FREE SAMPLE PROCESSING, FREE ENGINEERING SERVICE

Just Your Dish...

For QUICK, PROFITABLE TIME SAVINGS!



Coming right up! Time savings up to 50%! Burring, cleaning, finishing, polishing, in ONE OPERATION!

• PLACE YOUR ORDER NOW FOR QUICK ACTION—the quick *combination action* you get through the working advantages of *both abrasive and rubber* in Brightboy. You get a "cushioned" light-grind that's something to see — *plus* a surface that's really different. Smooth enough, frequently, to serve as the final polish! ALL IN ONE OPERATION!

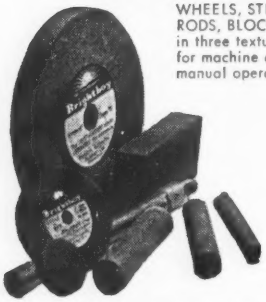
HOW BRIGHTBOY SAVES PRODUCTION TIME

Use it for countless jobs regular abrasives cannot do—PLUS low cost, "every-day" finishing. Bridge the gap between the rough grind and the buff in one operation! Work to close tolerances. Shape to contour. Obtain a wide variety of conventional and special finishes and patterns—damaskeening, for example. No before-use preparation or dressing needed. No skilled labor necessary.



TRY A TEST!

Ask your dealer for this sample card containing Brightboy blocks in 3 textures, and for the Brightboy Catalog-Manual. Write us if he cannot supply you—or on any problem where finishing is involved.



WHEELS, STICKS, RODS, BLOCKS in three textures for machine and manual operations

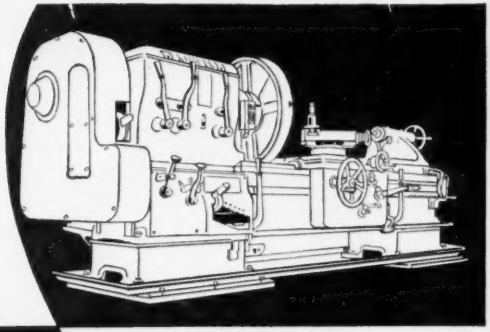
GENERAL USES—A FEW OF MANY:
Remove light digs, tool and heat marks. Clean welded and soldered joints. Finish dies and molds. Burr stampings, castings, machined parts. Maintain tools, equipment, machinery, parts.

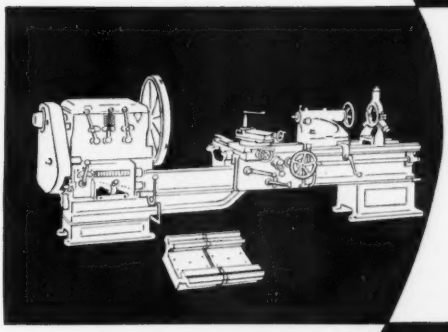
BRIGHTBOY FINISHES MANY MATERIALS
—defense products and civilian goods in
All Metals • Plastics • Wood • Glass • Hard Rubber • Pressed and Laminated Materials and Combinations.

WELDON ROBERTS
Brightboy
RUBBER CUSHIONED ABRASIVES

BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.
6th Ave. & No. 13th Street Newark 7, N. J.
America's Pioneer Manufacturer of Rubber-Bonded Abrasives

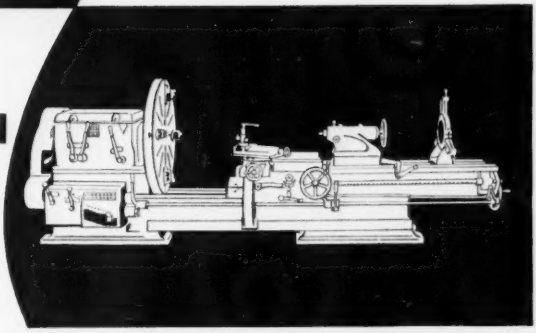
Heavy Duty Engine Lathes





Removable Block Gap Lathes

Extension Bed Gap Lathes



They're basic, economical, productive. Swing sizes from 18″ to 50″. Send for detailed information today!

Nebel

The Nebel Machine Tool Co., Cincinnati 25, Ohio, U.S.A.


Get a Load of
these NEW
MORSE
TOOLS

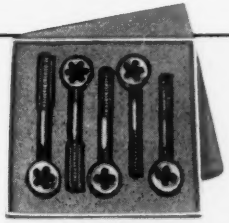
Here's a Brand-New Idea! . . . MORSE Taps and Dies Handsomely Boxed in Basic Sets and Conversion Sets

HERE'S ANOTHER MORSE ORIGINAL . . . these 7 well-chosen assortments of tools and sizes, protectively packaged in sturdy steel boxes with formed-wood inserts. You can buy these basic sets *now*, in either National Coarse Thread or National Fine Thread Series. Then later on, as you find need, you can buy the smaller conversion sets *in the other series* . . . and so complete your basic sets.

This is new convenience and economy in cutting-tool buying . . . a new idea from the main source of *all* really new cutting tool ideas . . . MORSE.

So get your basic Tap and Die Sets *now*, and convert them later, as you need to. Get in touch today with your Morse-Franchised Distributor for full details and prices on this new Morse "package deal".

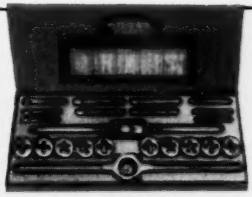
MORSE TWIST DRILL & MACHINE COMPANY
NEW BEDFORD, MASS.
(Division of VAN NORMAN CO.)
Warehouses in New York, Chicago, Detroit, Houston, San Francisco



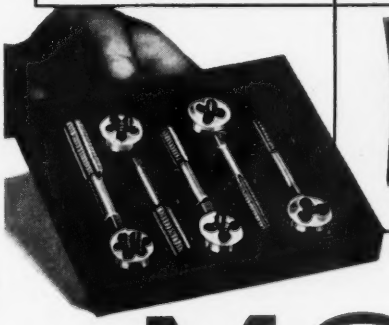
No. 93
CONVERSION TAP AND DIE SET



No. 100
MASTER TAP AND DIE SET



No. 101
MASTER TAP AND DIE SET





No. 31
MACHINE SCREW TAP & DIE SET



No. 200
HEXAGON
RETHREADING DIE SET

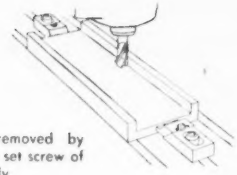
MORSE
Cutting Tools

Buy them by phone from your Morse-Franchised Distributor and save ordering time

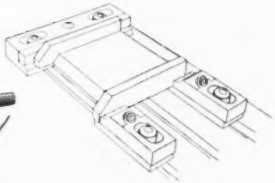
Eliminate U-Clamps, Straps and Fingers

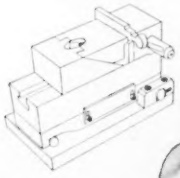
J & S *All-Purpose* JAW CLAMPS

secure work-pieces quickly and rigidly
easily adapted to box fixtures

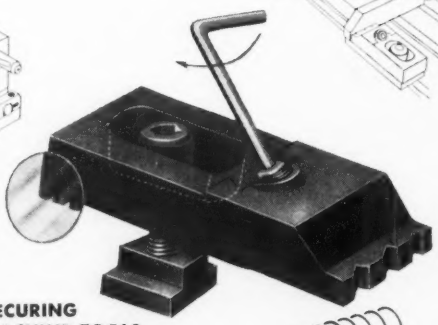


Work-piece removed by loosening one set screw of one clamp only.





Precision Grinding Vise with or without sine bar allows rapid unloading and exact relocating.

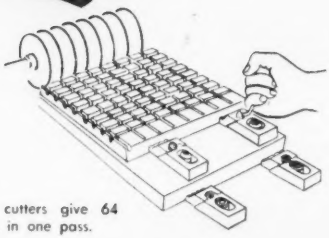


J & S Double Half Vise, for use on jig borers, millers, planers and shapers.

NEW METHOD OF SECURING WORK-PIECES TO MACHINE TOOLS

for Lathes, Planers, Milling Machines, Boring Millers, Jig Borers, etc. (9 different types including new Counter Clamp)

1. **Faster Set-up:** One *adjusting* screw provides a 5-ton force to *position* and *hold* the work-piece.
2. **Stronger Grip:** The *inward* and *downward* movement of the jaw clamp at a 45° angle gives a *single, powerful clamping action* — easily applied and controlled.
3. **Less Obstruction:** You can pass over the whole clamp 1" from the working surface of the machine face. *No interference with reading or measuring tools.*



Eight cutters give 64 pieces in one pass.

J & S TOOL CO., INC.
645 W. Mt. Pleasant Ave., Livingston, N. J.
(N. J. Route No. 10)

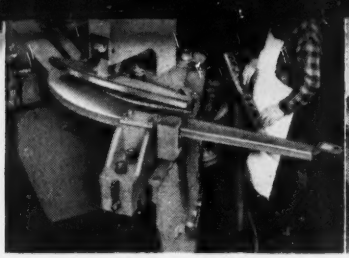


New home of J & S Tool Co., Inc.

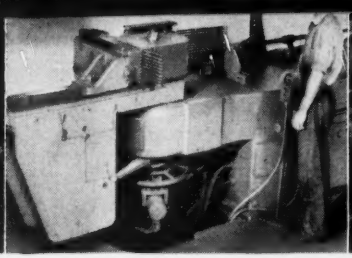
J&S TOOL CO. INC.

DELIVERY FROM STOCK
WRITE FOR NEW FOLDER!
—contains complete details on advantages, applications, types and sizes available.
Booklet describing J & S "Fluidmotion" Wheel Dressers, etc., also sent on request.

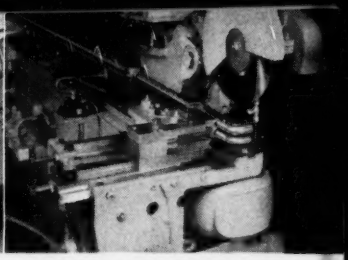




HEAVY, TAPERED HOLLOW SECTION — Pieces fabricated from 2 tapered welded strips of 12 gauge steel stock are given a 34" radius bend and a 41° edge bend on a Pines Size 4 Bender.



STEEL RODS — Multiple groove die on Pines Size 3 Automatic Bender forms ten 7/16" x 67-1/4" steel rods simultaneously to a 22" radius for farm implements.



COPPER ELLS — 3/4" ells are formed to 7/8" c/l radius and cut off automatically two at a time from 20 ft. stock lengths on a Pines Size 3/4 Bender.

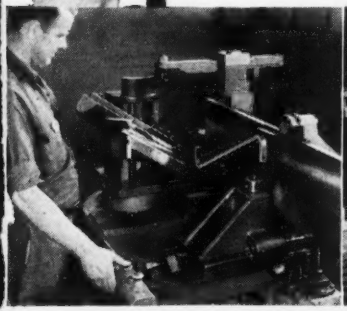
For NEW IDEAS in METAL FORMING



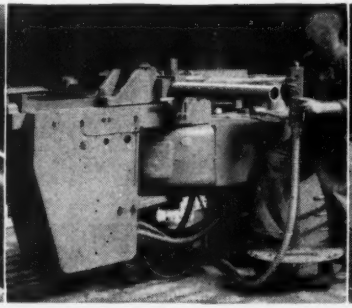
SQUARE TUBING—An eight foot length of SAE 4130 steel tubing 3" square, 1/4" wall, is compound bent to close tolerances. Segment mandrel maintains smoothness of the 10" inside radius bend.

investigate PRODUCTION BENDING the "PINES-WAY"

When you have a production problem of cold forming parts from round, square, rectangular, extruded or hollow stock to an even radius, or to different angles, chances are you will find the job can be handled more profitably on a Pines Automatic Bender. The examples shown here are only a few of the many different applications, in addition to ordinary tube bending, that are today handled efficiently on Pines machines. Production-wise and cost-wise, you will find bending the "Pines-Way" is a more accurate and profitable metal forming process. Investigate production bending today. Call on Pines engineers for assistance without obligation.



SQUARE STEEL BARS — Compound bends at each end and large center-radius helix are cold formed on a Pines Size 2 machine. Tooling costs reduced 75%, half of the production operations eliminated.



4" I.P.S. EXTRA HEAVY PIPE — Cold forming in place of hot bending on this Size 4 Pines bender eliminated a costly pickling operation at Allis-Chalmers' West Allis plant.



EXTRUDED ALUMINUM — Part of a production line set-up in a large aluminum fabricating plant, this small Pines Semi-Automatic bends an intricate extruded moulding for automobile window frames.

PINES ENGINEERING CO., INC.

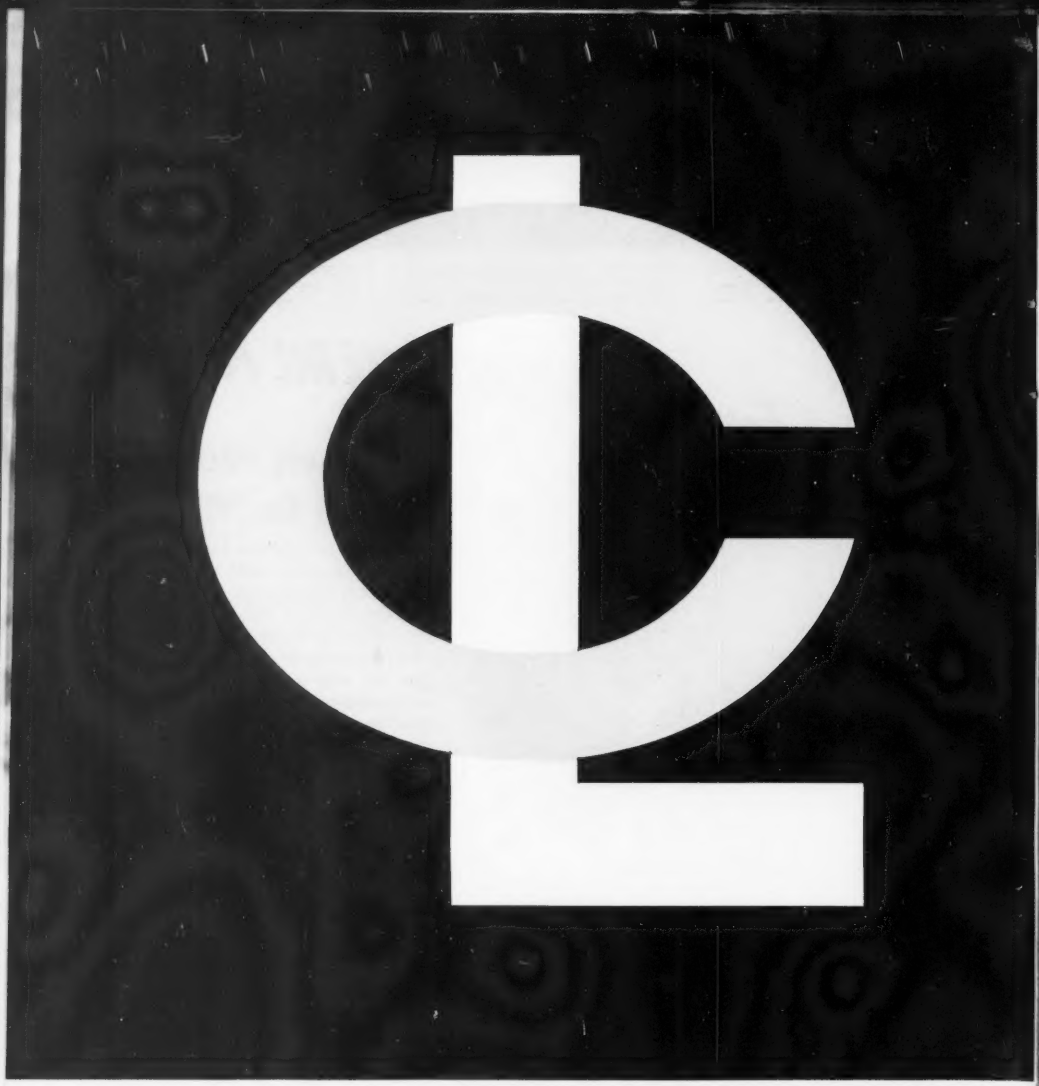
Specialists in Tube Fabricating Machinery

642 WALNUT • AURORA, ILLINOIS

WRITE FOR *Free* DATA SHEETS

To keep abreast with bending, ask to be placed on the mailing list for "Pines News", bi-monthly mailing piece that gives facts and figures on new unusual production applications.

BENDING • DEBURRING • CHAMFERING • THREADING MACHINERY

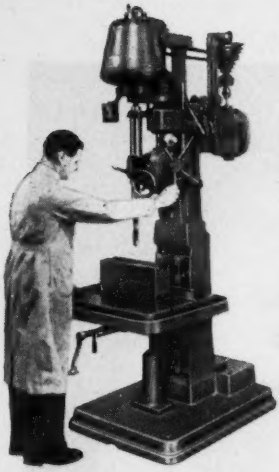


Cincinnati Lathes and Drilling Machines are so advanced that they deserve a new trade-mark — and here it is. You'll find it easy to remember, and well worth remembering. It stands for the company which designs, engineers, builds and backs up the most modern line of light and medium duty lathes (engine, toolroom and gap bed models) as well as drilling machines to cover practically all your drilling requirements. Write for catalogs and the name of your nearby CL dealer. He's always at your service.

best buys in their class!

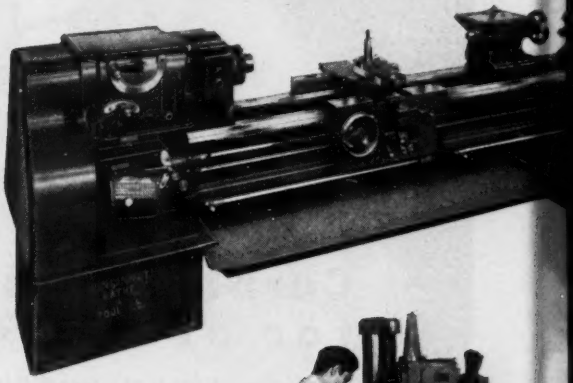
CINCINNATI LATHE & TOOL CO.

CINCINNATI 9, OHIO, U. S. A.

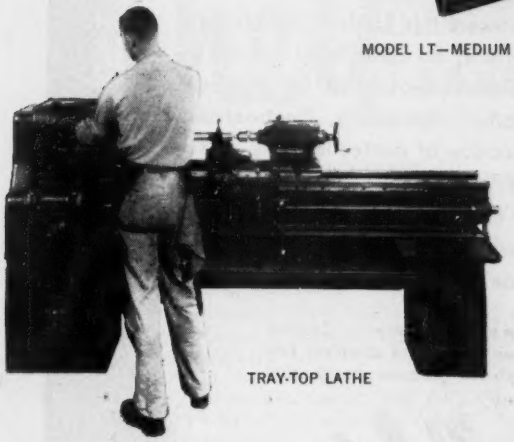


21" SLIDING HEAD BOX COLUMN FLOOR DRILL

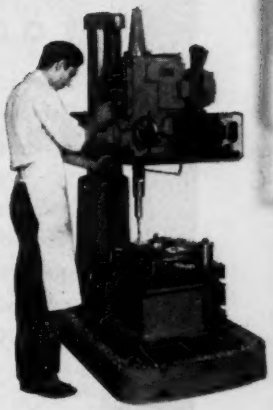
CINTIDRILLS: The complete, balanced line of drilling machines for all your drilling requirements for holes 1" OD and under. Complete line includes 3'-7" Radial, 21" Sliding Head (Box or Round Column), 21" Stationary Head, 16" 5000-10000 RPM, 16" 3000 RPM, 14" 3000 RPM for medium duty, 16" and 18" Royals for light duty. Bench, floor, and multi-spindle models. Nationally distributed.



MODEL LT—MEDIUM DUTY LATHE



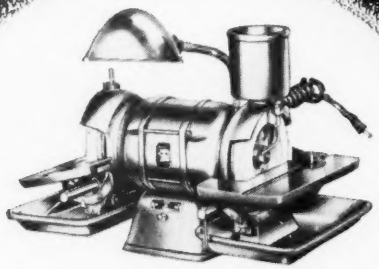
TRAY-TOP LATHE



3' ARM, 7" COLUMN RADIAL DRILL

CINTILATHES: The complete, balanced line: Tray-Top for light duty (engine, tool room and gap bed models); Model LT for medium duty (engine and gap models). All geared headstocks, flame-hardened and ground bedways, and many other fine features at minimum investment.
Swing sizes: Trap-Top — 10", 12½", 15", 18";
Model LT — 16", 18", 20", 24".
Write for catalogs and name of your nearest dealer.

CINCINNATI LATHE & TOOL CO., CINCINNATI 9, OHIO, U. S. A.



Carbide Tool Grinder for precision work

The ½ hp motor that powers this Baldor Carbide Tool Grinder has no commutator, no centrifugal switch, no brushes—a really trouble-free motor that will not burn out even when overloaded repeatedly. Electronically balanced within 1/50 ounce of perfection, the armature rotates at 3400 RPM without vibration—an engineering achievement that makes true precision work possible. First-grade wheels are re-balanced at our plant. Complete price, as shown, ... $142.60

Clip this ad and mail for bulletins on Carbide Tool Grinder shown above and complete line of 6" - 12" general purpose bench and pedestal grinders.

Baldor

BALDOR ELECTRIC COMPANY
4353 Duncan Avenue • St. Louis 10, Missouri



They SAVE YOU WORK!



Bunting Standard Stock Bearings

Costly machining is practically eliminated when you buy Bunting Standard Stock Bronze Bearings. They are completely machined and finished and can be fitted to unusual applications with very little further finishing.

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Your Bunting Distributor is an industrial distributor or a specialist in certain industrial items. You will find him listed in the classified section of your telephone book—most likely under the heading Bars, bronze or Bearings, bronze. He carries in stock, for your money saving convenience, completely machined and finished Bunting Standard Stock Industrial Bearings, Electric Motor Bearings and Precision Bronze Bars in a complete range of sizes meeting all your usual production and maintenance needs. Ask him for catalog.

Bunting®



BRONZE BEARINGS • BUSHINGS • PRECISION BRONZE BARS

THE BUNTING BRASS & BRONZE COMPANY • TOLEDO 1, OHIO • BRANCHES IN PRINCIPAL CITIES
DISTRIBUTORS EVERYWHERE

ANOTHER SMITH TECHNICAL ACHIEVEMENT



Rotate Tip in any direction while flame is burning



CHANGE TIPS IN 6 SECONDS

No wrench needed. Fingers do the job. Just insert new tip — spin nut down — that's all.

GUARANTEED service for the rest of your life on all Smith's "LIFELONG" welding torch bodies and cutting assemblies.

This speeds up production schedules and reduces operator fatigue. The average welder is on a stop-and-go basis most of the day — shifting to new positions — stopping to adjust his work — losing production time. This new Smith Equipment makes it possible to work in comfortable and convenient positions because the tip can be turned in any direction even while flame is burning.

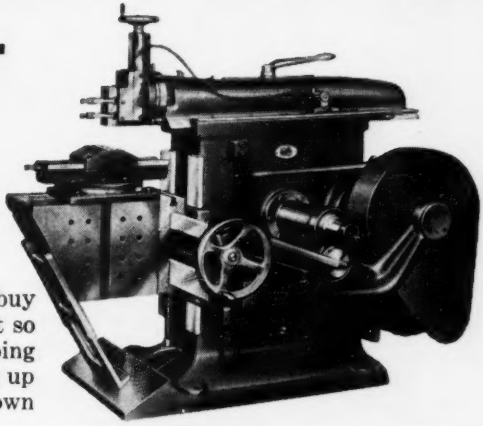
No time out to shut off flame, adjust tip angle or move work. Just a twist of the finger, or a tap on the side of the tip does the job. It's a time-saver. This feature plus high speed change of tips (in 6 seconds — no wrench needed) is available in Smith's "LIFELONG", MIDLINE and AIRLINE Torches. Write us today.

SMITH WELDING EQUIPMENT CORP.

Dept. MMS-32, 2633 4th St. S. E., Minneapolis 14, Minn.

93

Now ~~72~~ Busy Plants Are Cutting Machining Costs with KLOPP High-Production Shapers



IMMEDIATE DELIVERY FROM STOCK

KLOPP shapers cost so little to buy . . . so little to run, yet turn out so much production, they're stepping into plant-after-plant—stepping up toolroom output and cutting down costs.

Bulky, awkward-to-handle work pieces are easily accessible and simple to set up in the KLOPP—because the *head travels to the work*. It's built for high-speed, too, by Europe's largest manufacturer of shapers—at KLOPP'S fully integrated plant—where the complete machines, including all their components from castings to electric motors, are produced.

Write for names of prominent KLOPP users near you. And ask us to quote on your requirements for one or a battery of these fast-producing cost cutters.

Engineered servicing from Orban Service Centers in Cleveland, Detroit, Newark. Stock parts from Cleveland.

SPECIFICATIONS

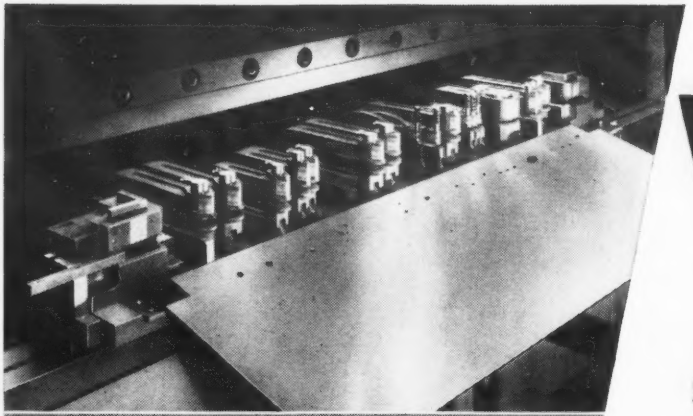
MECHANICAL SHAPERS—stroke lengths 16¾", 20⅔", 26⅝". Six rates of speeds with normal motor, 12 with two-speed motor. Accelerated return motion. Single lever control within easy reach of operator. Swivel work table can be set to either side at any angle up to 90°.

FULLY HYDRAULIC MODELS—stroke lengths 26", 33½", 39½". Infinitely variable ram speeds with quick return and minimum power consumption. Central operator control panel. Tool holder with graduated scale swivels 45° to either side. Self-acting downfeed of tool slide. Automatic tool lifting device available.

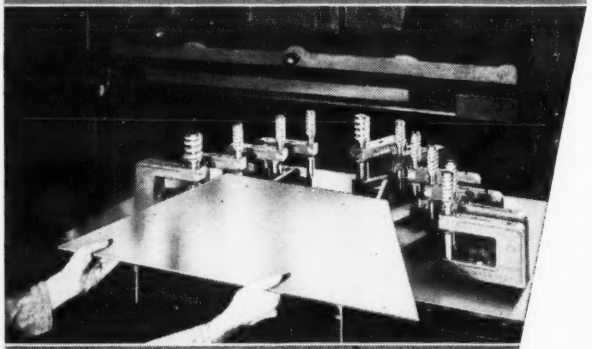
KO ED. INC. INDUSTRIAL IMPORTERS

KURT ORBAN COMPANY, INC.

205 E. 42nd St., N. Y. 17 • 4220 Prospect Ave., Cleveland 3 • 19450 James Couzens Highway, Detroit 35
1939 Santa Fe Ave., Los Angeles



Showing Wales Type "BL" Hole Punching and Type "N" Notching Units in a combination press brake setup for punching and notching mild steel up to 1/8" THICK.



A stamping press setup of Wales Type "CJ" Hole Punching Units for punching mild steel up to 1/4" THICK.

PUNCHING 1/8", 1/4" AND 3/4" THICK METAL ?

standardize on WALES Hole Punching Units

Only Wales Hole Punching and Notching Units provide the numerous *patented features* plus the *time and cost saving advantages* that have made it "standard practice" with thousands of metal fabricators to *standardize* on this *exclusive* equipment.

Wales independent, self-contained Units eliminate costly, single-purpose custom dies, reduce expensive setup time and practically eliminate press "downtime."

The same group of Wales Units may be interchangeably set up in stamping presses and press brakes. In many cases, setups of Wales Units are in production the same day a hole punching pattern is released by your engineering department.

The multiple advantages of Wales Hole Punching and Notching Equipment are too MANY to tell here, so write for fully-illustrated, functionally colored catalogs TODAY.

WALES-STRIPPIT CORPORATION

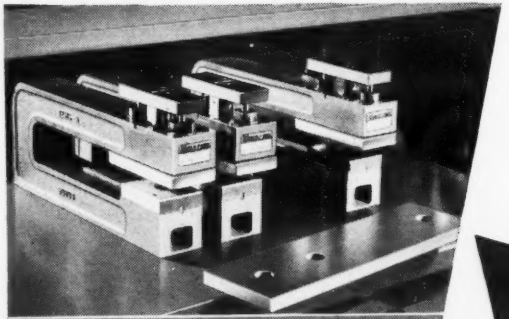
George F. Wales, *Chairman*

398 Payne Avenue, North Tonawanda, N. Y.

(Between Buffalo and Niagara Falls)

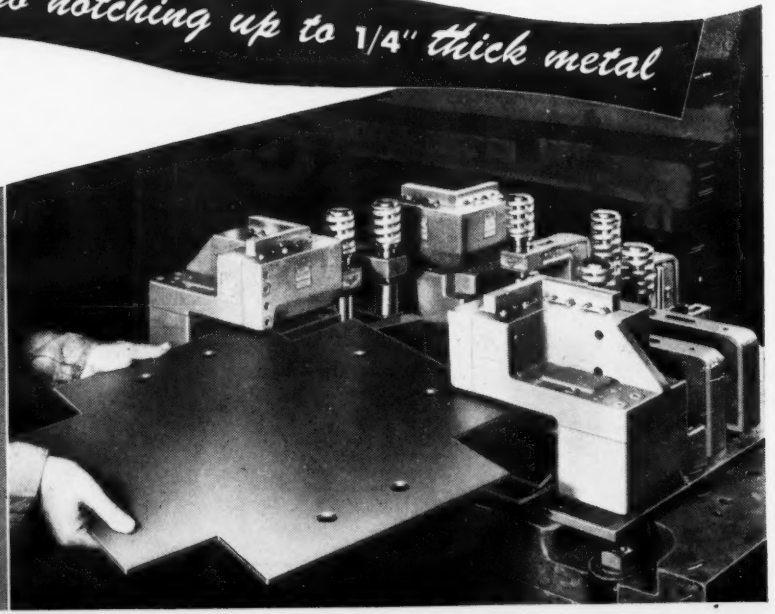
Wales-Strippit of Canada, Ltd., Hamilton, Ontario

Specialists in Punching and Notching Equipment



Showing a setup of Wales Type "HS" Hole Punching Units in a press brake for punching mild steel up to 3/4" THICK.

also notching up to 1/4" thick metal



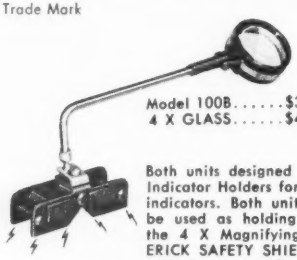
Showing a setup of Wales Type "NJ" Notching Units in a stamping press for notching mild steel up to 1/4" THICK.

Cut INDICATING TIME On Machine Operations

MAKE YOUR LIGHTING MORE FLEXIBLE • INCREASE WORKER SAFETY

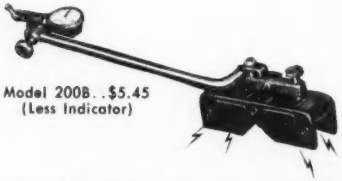
Over 75,000 Customers are now doing just this by using one or more units of this complete line of ERICK MAGNA-HOLDER* Tools & Accessories. Magnetic Base Units are constructed with powerful, guaranteed lifetime Alnico magnets exerting a *fifty pound pull!* Eliminates time-consuming clamps and fixtures.

* Trade Mark



Model 100B.....$3.95
4 X GLASS.....$4.25

Both units designed for use as Indicator Holders for small test indicators. Both units can also be used as holding bases for the 4 X Magnifying Glass or ERICK SAFETY SHIELDS. Magnetic base grips firmly to ferrous surface of any machine. Pivotal holding rods allow universal settings. NOTE PRECISION ADJUSTMENT ON MODEL No. 200B, similar to surface gauge, allowing minute adjustments of indicator by merely adjusting thumb screw!

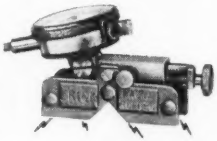


Model 200B..$5.45
(Less Indicator)

Model 300.....$2.95
(Less Indicator)

Designed for use with the larger test indicators for use as lathe stops, assuring fast accurate work in facing, turning, boring, etc.





Model 350 .....$8.50
(Less Indicator)

NOTE PRECISION ADJUSTMENT ON MODEL No. 350, permitting the most minute adjustment of indicator by simply turning thumb screw!



Model 600 ..$6.50

Model No. 600 complete with 25 Watt bulb for concentrated light on close work, for layout, inspection, at saws and filing machines. Model No. 675 accommodates up to 100 Watt bulb. Ideal where considerable light is required. Magnetic base on both units provides firm grip on any ferrous surface, adjustable holding rods and globe arrangement permits focusing of light anywhere required!



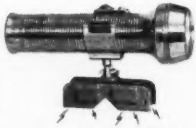
Model 675 ...$8.50

Transparent, 1/8" thick plexiglass safety shield fastens on holding rod of both Model 100B or 200B in a jiffy. Provides worker protection from chips, sparks, lubricants, etc., on any machine needed.



Two Sizes:
No. 400—5"x7"—$3.50
No. 500—8"x10"—$4.25

Model No. 700 is valuable tool for mechanics, plumbers, electricians, and maintenance men. Magnetic base holds firmly to any ferrous surface while ball socket arrangement permits focusing flashlight in any direction, LEAVING BOTH HANDS FREE TO WORK!



Model 700 ...$3.50

Look for attractive display chest at your mill supply or hardware dealers, featuring our entire line. He will be glad to show you these time saving tools, or write for Bulletin No. 752. If your dealer cannot supply, order direct and give us dealer's name.

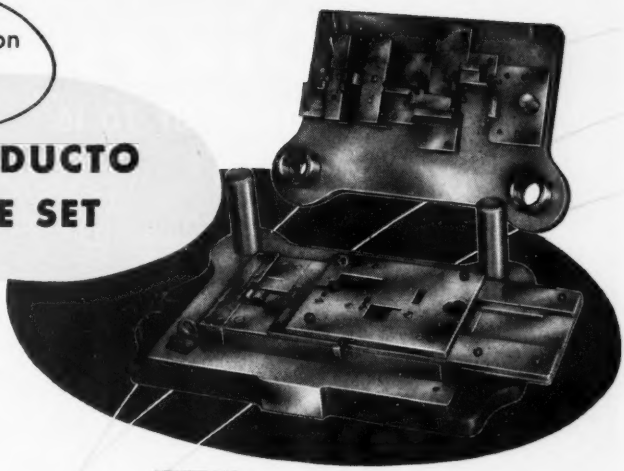
CULLEN MANUFACTURING CO.

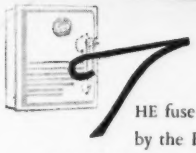
RACINE • WISCONSIN

teamed precision
of die and

**PRODUCTO
DIE SET**

makes this
intricate
job
possible

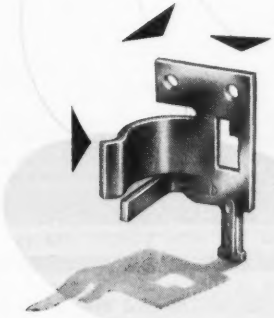




HE fuse terminal, shown below, is produced by the Federal Electric Products Co. for use in their Noark front operated safety switch. A Producto Die Set was selected to maintain the precise production of a top quality die at high speed operation.

Material is half hard 3/32" copper (Rockwell 30-40 B scale), automatically fed to a Niagara 40 ton press. The progressive die stations are 1) pierce and stamp, 2) notch, 3) lance and emboss, 4) form 5) finish form. Die is held to extremely close tolerances. Production: 4000 pieces (1-3/16" x 2-1/8") per hour, 70,000 between grinds.

Today's production calls more than ever for quality control . . . which, in die work, necessitates the best in die sets. Call for Producto . . . and be sure!



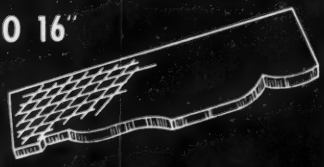
the **PRODUCTO MACHINE COMPANY**
910 HOUSATONIC AVENUE
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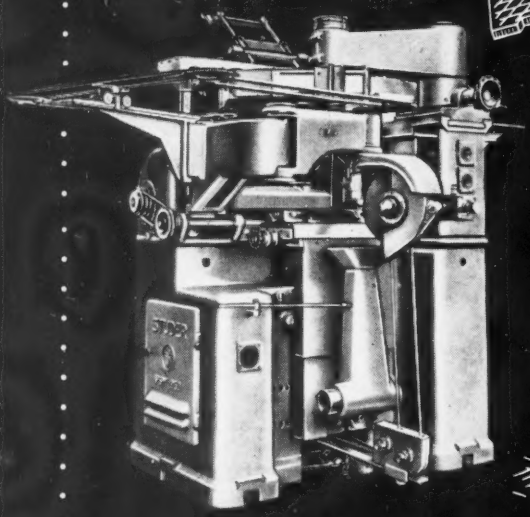
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THE STUDER PSM-250

GRINDS PROFILES UP TO 16"

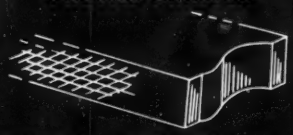
IN ONE SETTING





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NEW STUDER PROFILE GRINDER



INCREASED CAPACITIES
The PSM-250 grinds profiles up to 16" long in one setting and accepts flat work pieces up to 4½" thick and rounds up to 10" diameter. Templates up to 24" long are easily accommodated. The adjustable pantograph can be set in any ratio from 1:1 to 1:10.

CLEARANCE ANGLE AND RELIEF GRINDING
Attachments are available to grind different clearance angles on flat form tools—*without correcting template form;* and, to relief-grind punching and drawing dies.



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This attachment automatically guides tracer bar along the template. The automatic, uniform feeding produces improved surface finishes and increases the life of grinding wheels. To guide tracer bar by hand, two screws are loosened to detach the device.

PRECISE GRINDING
Profiles can be ground to a tolerance of ± 0.0004". Closer limits are obtainable when large ratios of reductions are employed.

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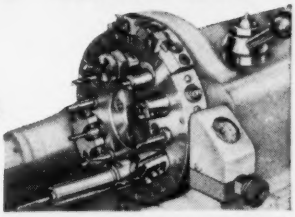
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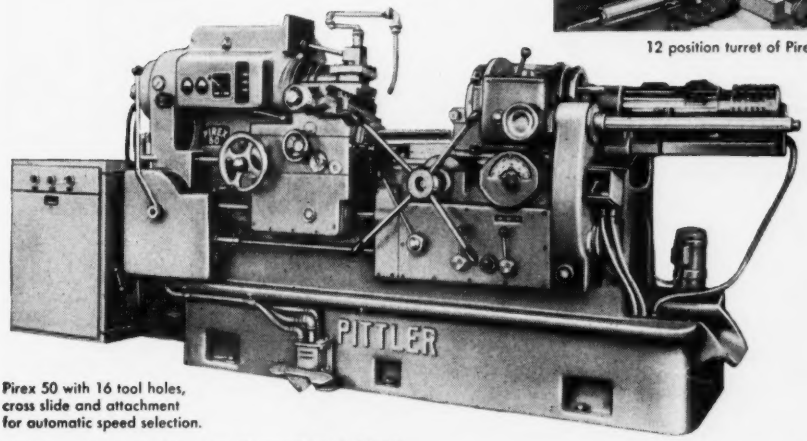
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with 12 or 16 Turret Tool Holes



12 position turret of Pirex 32



Pirex 50 with 16 tool holes, cross slide and attachment for automatic speed selection.

Meet your increased turning demands with PIREX Turret Lathes. Built by Pittler, manufacturers of turret lathes for over 60 years, PIREX Lathes have all the latest engineering features for maximum output . . . 12 or 16 tool holes to reduce set-up time . . . Powered with motors up to 12 hp for high speed cutting with carbide or high speed tools.

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	PIREX 32	PIREX 50
Bar capacity	1.25"	2"
Swing over bed	14"	15.7"
No. of Tool Holes	12	16
No. of Spindle Speeds	16	11
Spindle speed R.P.M.	71-1800	
	90-2250	18-1800
Feeds — Longitudinal and transverse		
Fine . . . . . i pr	.001"-.009"	.001"-.009"
Medium . . . . . i pr	.002"-.020"	.002"-.020"
Coarse . . . . . i pr	.004"-.040"	.004"-.040"

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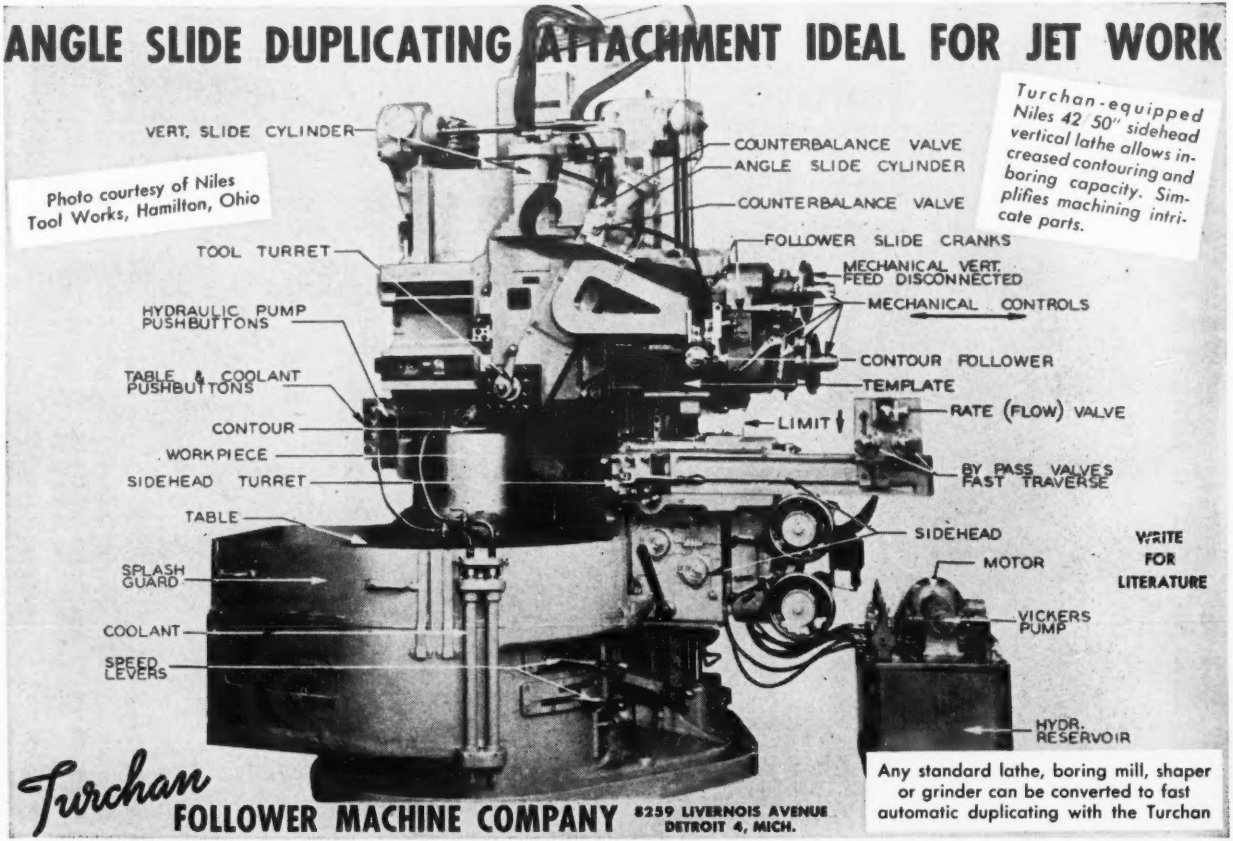


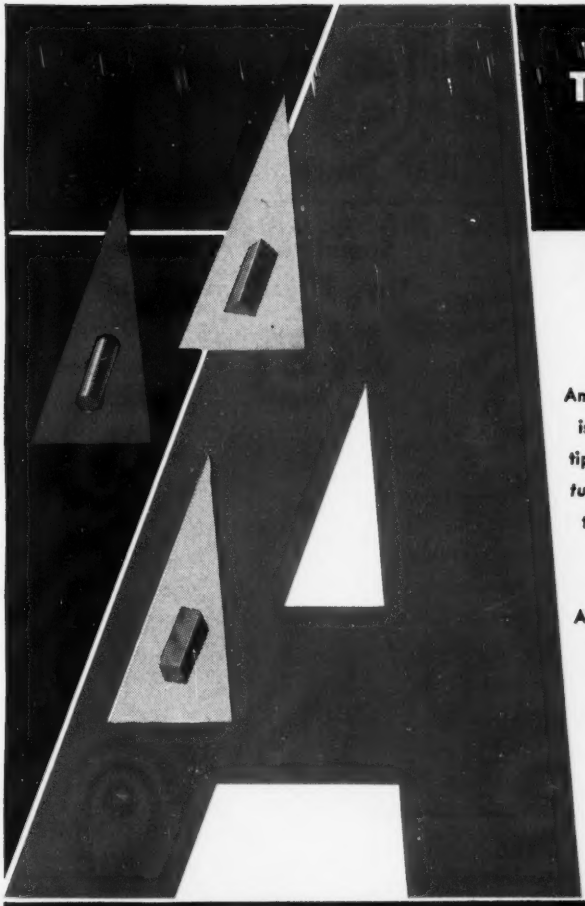
Photo courtesy of Niles Tool Works, Hamilton, Ohio

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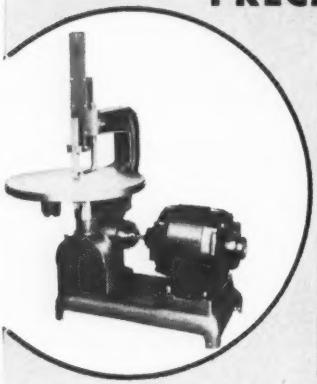
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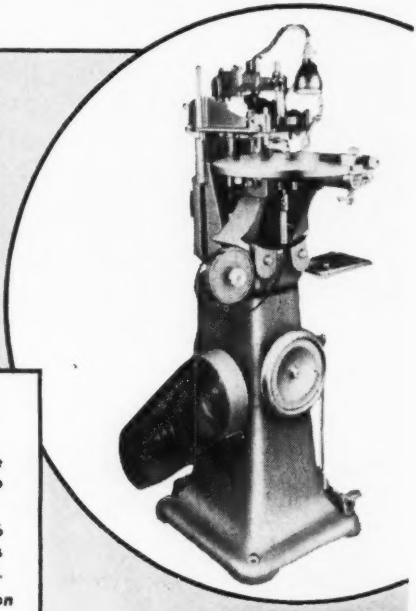
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They Effect Savings in
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. . . yet they're so simple to operate skilled labor is not required.

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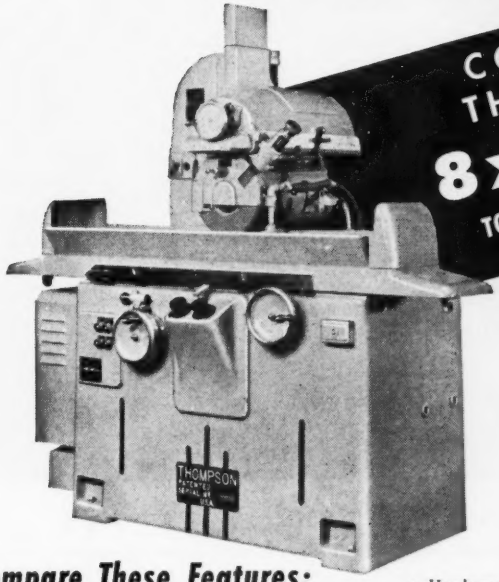
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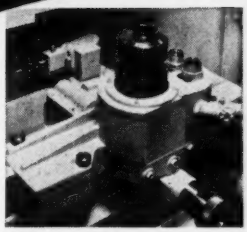
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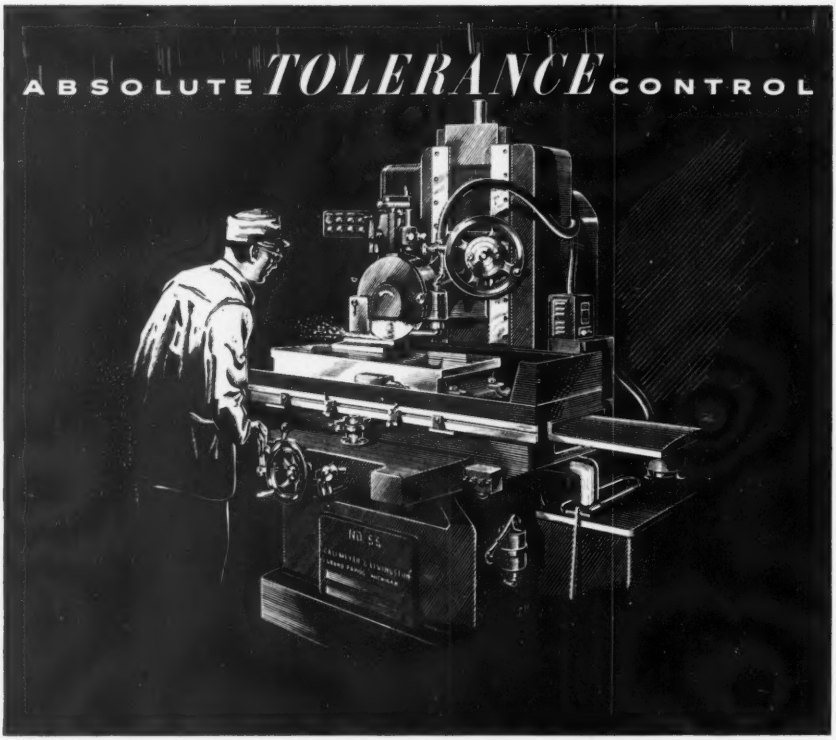
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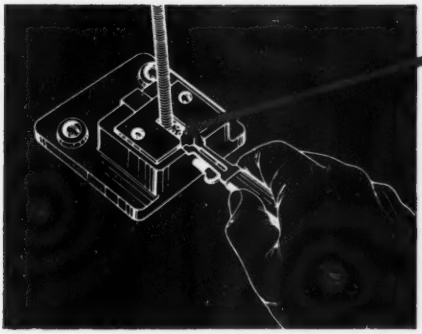
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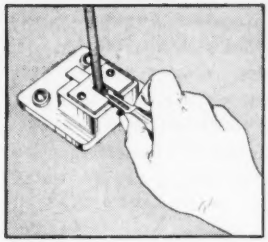


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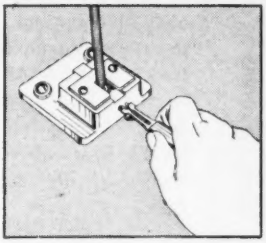
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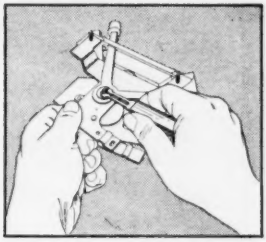
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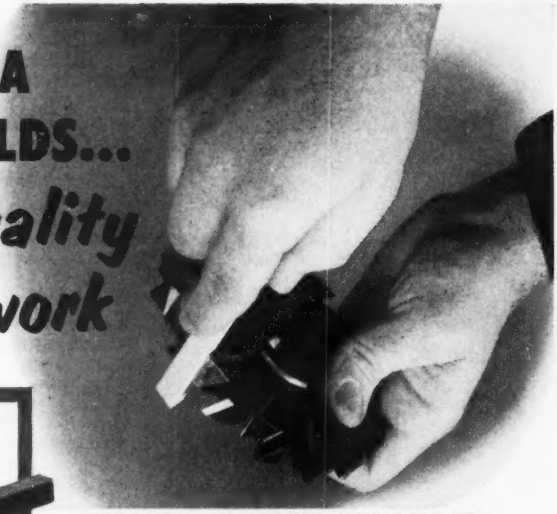
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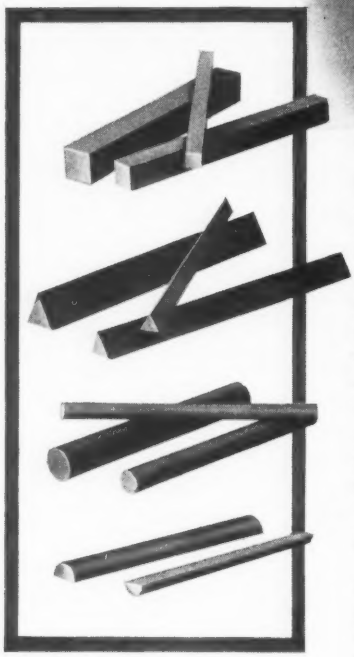
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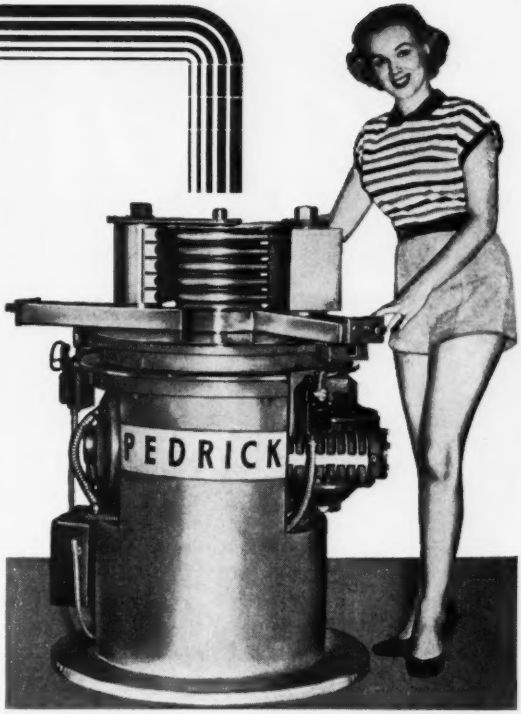


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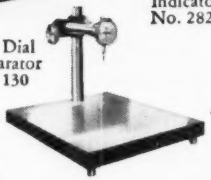


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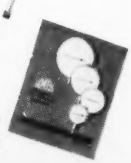
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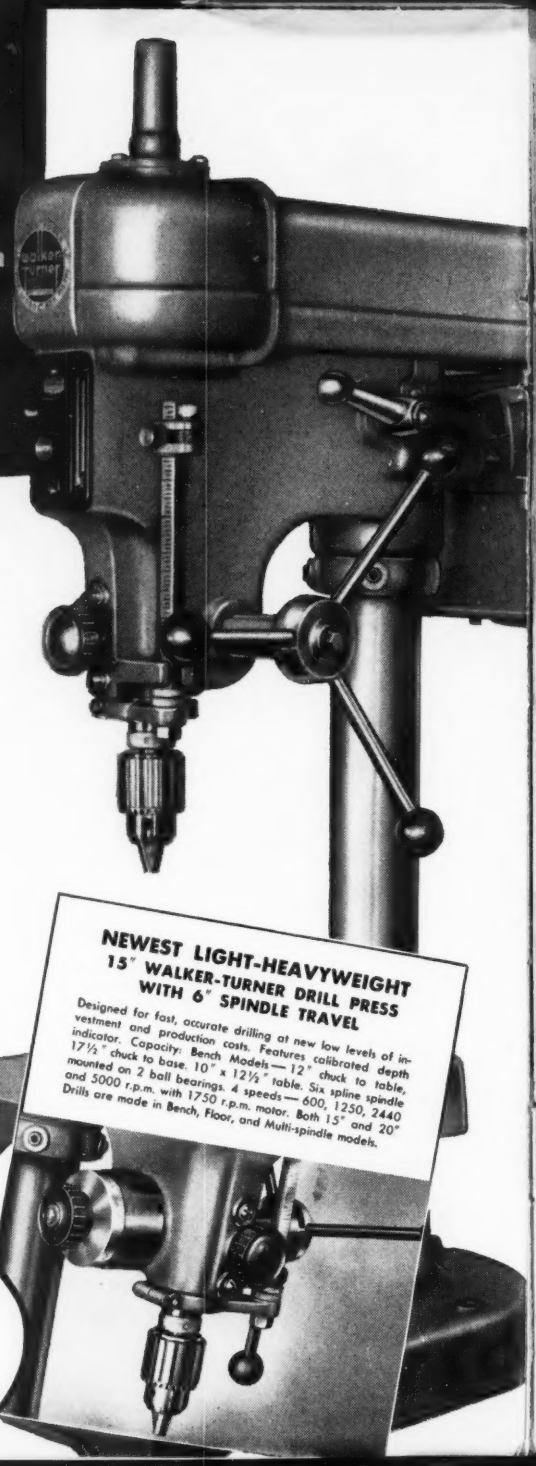
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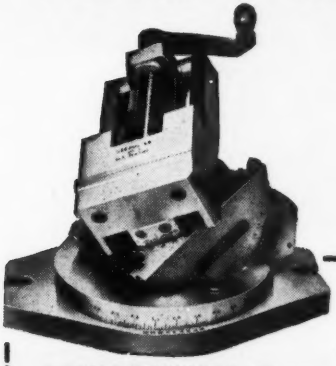
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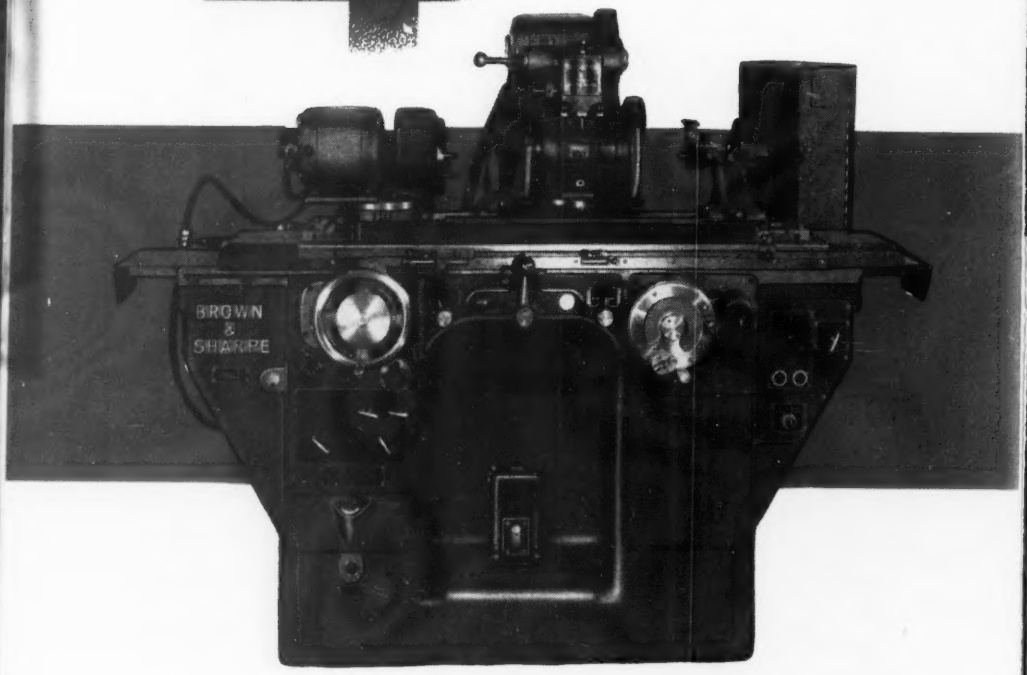
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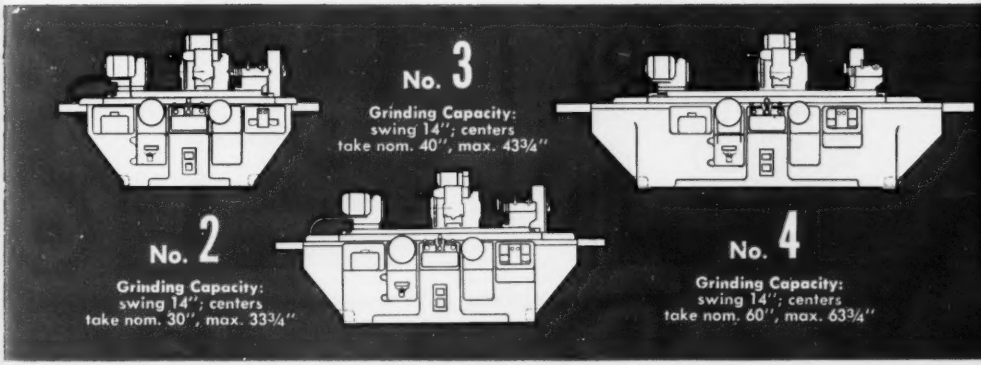
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Productioneered to handle the widest variety of precision work at production speeds



This entirely new line of Brown & Sharpe Universal Grinding Machines bridges the long-existing gap between conventional universal and single-purpose grinding machines. Their many new and exclusive features provide exceptional grinding flexibility, rigidity, and accuracy. Instant combining of operating functions into automatic cycles extends the usefulness of this equipment beyond the toolroom and job shop, to many production applications.

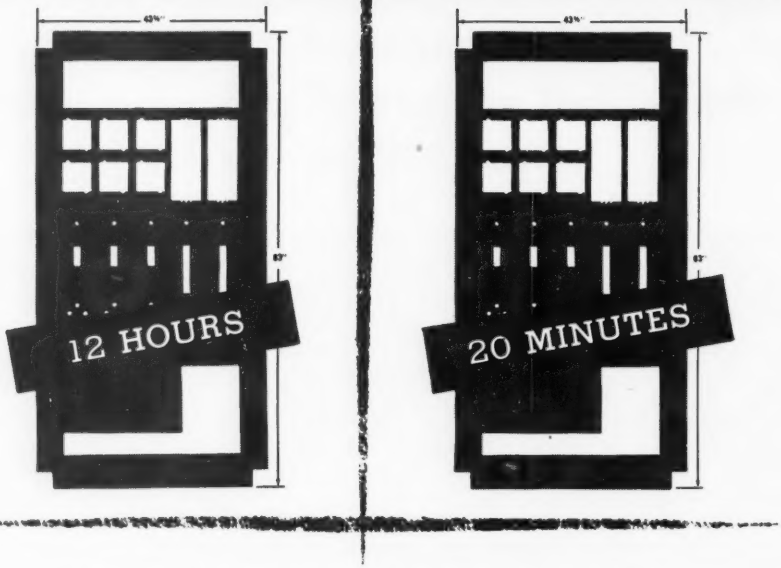
Write for illustrated Bulletins. Brown & Sharpe Mfg. Co., Providence 1, R. I., U.S.A.

Brown & Sharpe B·S

- Greater Flexibility of Grinding Speeds
- Hydraulic Table Drive Maintains Smooth, Constant Table Movement
- Removable Unit Type External Grinding Spindle
- Unique Universal Turret Provides Extra Work Capacity
- Faster, More Accurate Sizing
- Built to J.I.C. Electrical and Hydraulic Standards
- Additional Automatic Functions Available to Increase Productive Flexibility

LOOK WHAT HAPPENED

when PENN Electrical Co. put in a WIEDEMANN!



On production of switchgear panels in lots of 1 to 10 of a kind, Penn Electrical Co., Irwin, Pa., reduced handling operations from 11 to 1, and eliminated layout and set-up time.

WHAT DOES THIS MEAN IN PRODUCTION SPEED-UP? The actual times shown above speak for themselves.

WHAT DOES THIS MEAN TO YOU? If you produce short runs of *any sized* pierced work, the Wiedemann method can give you similar savings.

HOW CAN YOU COMPARE? Just send drawings for a Wiedemann time study. No obligation, but it'll be an eye opener.

WIEDEMANN MACHINE COMPANY

4219 Wissahickon Avenue, Philadelphia 32, Pa.

Genuine NATIONAL ACME Collets and Pushers for ACME-GRIDLEY AUTOMATICS

are *made only by* and are *available only from* NATIONAL ACME

IF YOU CONCENTRATED FOR 50 YEARS on the improvement of most any single purpose product, you would have achieved top acceptance or you would be out of business. It's the same for Acme-Gridley Collets, Pushers and other stock feed components.

The perfect collet has never been built—in any brand. But from our continuous study of all designs in hundreds of plants under all Acme-Gridley operating conditions, we know that these "National Acme" branded components have achieved the near-perfect in the primary essentials of—

- **positive gripping power**
- **uniformity of heat treatment**
- **precision grinding and gauging**
- **ease of adjustment in use**

These are the practical results through which most owners of 45,000 Acme-Gridley Automatics prove for themselves superior performance and low overall cost. (Prompt deliveries to suit your particular requirements.)

The NATIONAL ACME Company

170 East 131 St. • Cleveland 8, Ohio.

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids Contract Manufacturing



Write for complete details in Catalog CP-49A.





Master Collet and Pads

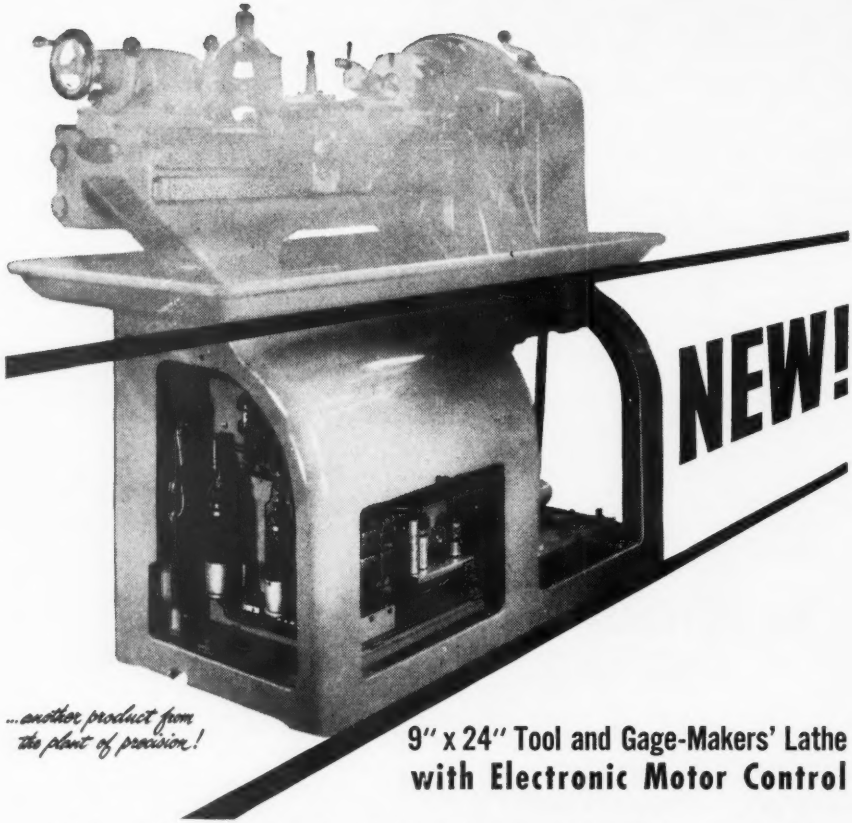


Solid Pusher



Master Pusher and Pads

Nowhere can you get so much for your Collet and Pusher dollar as at the source of your machines to which they are engineered.

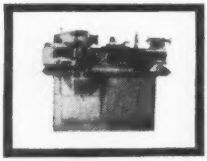


...another product from the plant of precision!

9" x 24" Tool and Gage-Makers' Lathe with Electronic Motor Control

Now you can have the advantages of quiet, simple, modern Hendey Electronic Motor Control on the Hendey 9" x 24" Tool and Gage-Makers' Lathe. These advantages include stepless spindle speeds from 25 to 3000 R.P.M. by potentiometer control of both field and armature of the 3 H.P. d-c motor. Exceptionally close speed control is obtained even under changing load. I.R. compensation gives full torque at low speeds over the complete armature control range. A full stop from maximum speed is accomplished in approximately 1½ seconds. Starting, stopping or reversing, even at 3000 R.P.M., is accomplished smoothly and rapidly. This new drive is optional equipment, and full information is available in our new 9" x 24" Lathe catalog. Write for your free copy! It gives full details on the new drive as well as other features of the Hendey 9" x 24" Lathe, which guarantee precision output with minimum effort.





MODERN Hendey

THE HENDEY MACHINE CO., INC.
MAIN OFFICE & PLANT: TORRINGTON, CONN.
BRANCH OFFICES: New York, Chicago, Boston, Detroit, Rochester, Los Angeles, San Francisco
REPRESENTATIVES: Philadelphia, Cleveland, Pittsburgh



Here are the end mills you can count on for fast, free cutting and extra long life—a bonus provided by complete uniformity and assured by Putnam's rigid quality control. For more work for your money, specify Putnam High Speed End Mills. Over 1000 standard sizes and types available.

PUTNAM

TOOL CORPORATION

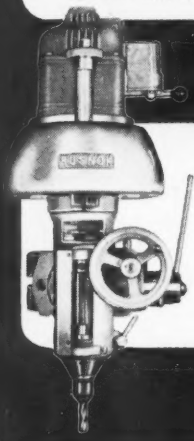
2981 CHARLEVOIX AVENUE · DETROIT 7, MICHIGAN

RUSNOK MILL HEADS

¼ H. P. CONVERTICAL MILL HEAD

Only low cost mill head with quill travel attachment.
High speed medium-light operation.
For bench, floor and pedestal mills.
Fits milling machines with overarm 1½" to 3".
⅜" end mill capacity.



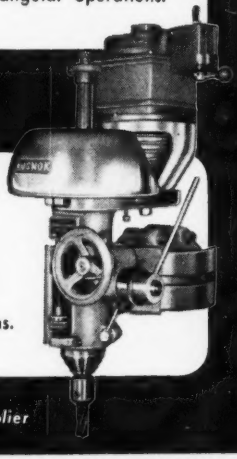


½ H. P. MILL HEAD

HEAVY DUTY MILLING ATTACHMENT
Fits milling machines with 3" to 5" overarm.
¾" end mill capacity.
For vertical, horizontal and angular operations.

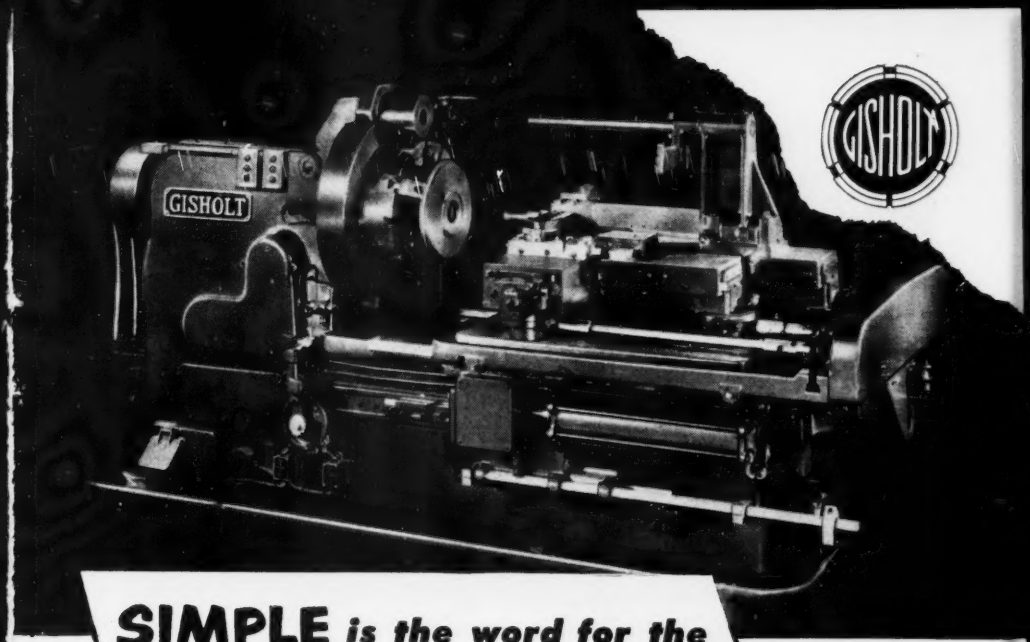
1 H. P. MILL HEAD

HEAVY DUTY MILLING ATTACHMENT
Fits milling machines with 3" to 5" overarm.
¾" end mill capacity.
For vertical, horizontal and angular operations.



WRITE for complete details and give name of your supplier

RUSNOK TOOL WORKS, 4840 W. North Ave., Chicago 39, Ill.
MILLING • DRILLING • BORING

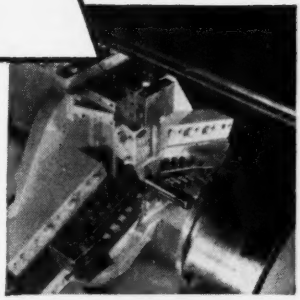


SIMPLE *is the word for the* SIMPLIMATIC!

Wherever you have a sufficient run of similar parts, the Simplimatic Automatic Lathe can solve several of your problems at once.

1. High speed production assures larger output at lower cost per piece.
2. The wide variety of tool arrangements on the large, flat table of the *Platen Type* Simplimatic (shown above) makes it adaptable to a wide range of work.
3. Training time is reduced to a minimum because the entire machining cycle is completely automatic. One operator normally runs several Simplimatics.

The extreme flexibility of the standard Simplimatic can frequently give you all the advantages of a machine designed especially for your job. If you want simple, quick, lower cost production, this is a good time to investigate the Gisholt Simplimatics. Ask for literature.



***The Radial Type* Simplimatic** is ideal for machining flywheels, etc., with wide faces and multiple inside and outside diameters. Extreme rigidity permits multiple tooling and maximum cutting speeds, sustained accuracy and excellent life of cutting tools.



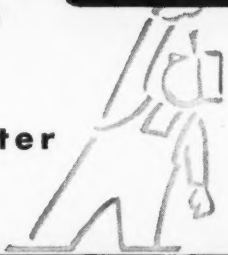
THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

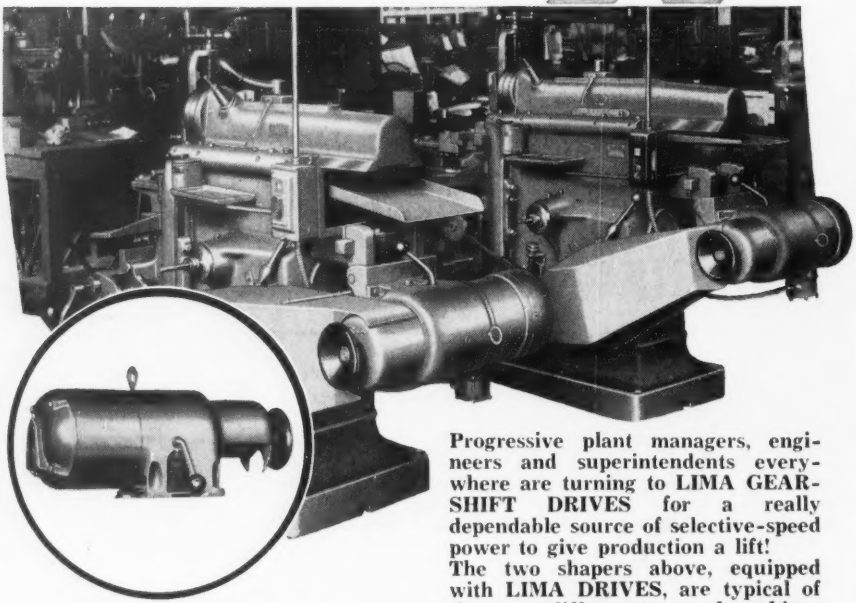
GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

LIMA production gives a LIFT

at International Harvester Company Plants





LIMA GEARSHIFT DRIVES

Available for prompt delivery in constant-horsepower ratings of ½ to 15 HP. Four or eight speeds.

Progressive plant managers, engineers and superintendents everywhere are turning to **LIMA GEARSHIFT DRIVES** for a really dependable source of selective-speed power to give production a lift!

The two shapers above, equipped with **LIMA DRIVES**, are typical of the many different types of machines Lima has individually motorized at the Fort Wayne Works of International Harvester Company.

Let Lima survey your machines—get the production advantages you want.

WRITE FOR LITERATURE

Representation in principal cities

LIMA GEARSHIFT DRIVES & MOTORS

THE LIMA ELECTRIC MOTOR COMPANY

160 FINDLAY ROAD • LIMA, OHIO

"We standardized on SKIL Drills for low maintenance, local factory service,"

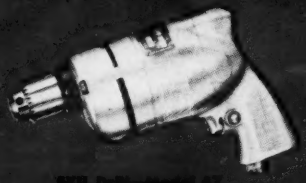
—says **Roy Berger,** factory manager,
CASTLE INDUSTRIES, INC., Paine Field, Everett, Washington

"We use 25 Model 47 SKIL Drills constantly in our sub-assembly of aircraft parts and manufacturing of precision stainless steel and aluminum products," says Mr. Berger. "We give portable tools long, tough use, and *must* have parts and repair service available. The local SKIL Factory Branch Office is the answer. However, due to SKIL quality, maintenance has been very low, performance has been the best! SKIL Drills are first-rate—light and compact, ideal for aircraft production."

For complete information call your distributor or your nearest SKIL factory branch



Ernest Brevik uses SKIL Drill Model 47 with floating drill guide in assembly work. He says, "Compact size of this SKIL Drill makes jobs like this possible. They have more power for their size than any drill I've used."



SKIL Drills—Model 47
½" drill. Compact, heavy duty. Capacity in hardwood: 0" to ½", in steel: 0" to ¼". Standard speed: 1800 r.p.m. Faster and slower speeds available. Overall length: 7¼". Weight: 3½ lbs.

SKIL

SKIL Products are made only by
SKIL CORPORATION
formerly SKILSAW, Inc.
5033 Elston Avenue, Chicago 30, Ill.
Skil Factory Branches in 24 Principal Cities
In Canada: Skilsaw, Ltd., 3255 Dundas Street West, Toronto 9, Ontario

"as a diemaker I have never seen ANYTHING like it!"



Powell Steel Products, Chicago, pioneers of simplified design in plastering accessories, used the advantages of Pivot round punches to replace customary triangular perforations in metal plaster lath. This resulted in savings in tooling, increased production and lower maintenance cost. Mr. William Dempewolfe, Supervisor, says "As a Diemaker, I have never seen anything like the Pivot Punch. It is one of the best things that has come into the diemaker's business in a long time."

MORE THAN 264,000,000 PERFORATIONS WITHOUT BREAKING A SINGLE PUNCH!

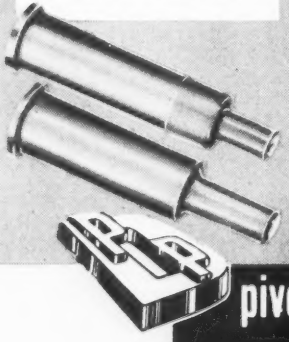
PIVOT HIGH SPEED STEEL **PUNCHES**

STRAIGHTGROUND • WHIPSLEEVED

A Powell Steel product required 32-3/16 holes and 16-3/16 holes in 8-inches of .018 electro galvanized steel, automatically roller fed into press and rolling machine . . . a job for **any** punch! The 48-punch die was equipped with Pivot Straightground Whipsleeve Punches and 5,500,000 strokes have already been run **without breaking or replacing a single punch** . . . and it's still going strong!

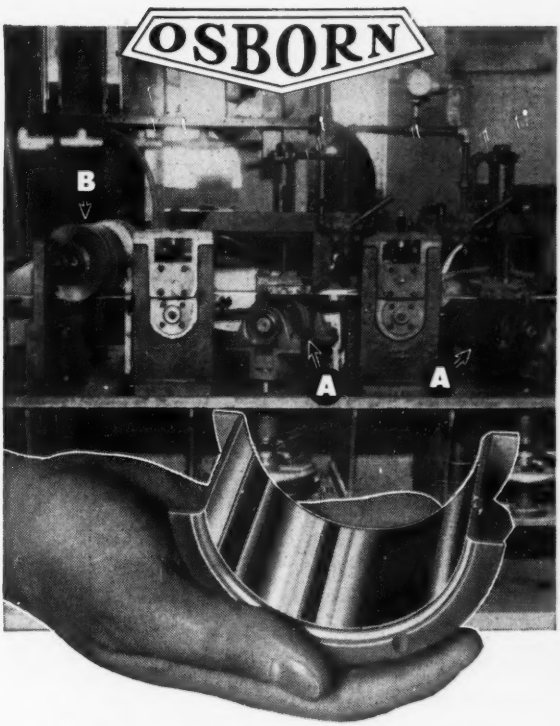
In addition to providing complete dependability, Pivot Punches have the concentricity and power that assures more accurate stampings and longer punch life with minimum maintenance cost. Whatever your perforation requirement, put Pivot advantages to work for you as soon as possible.

SEND FOR FREE CATALOG AND STANDARD PRICES. WRITE DEPT. M.M.



pivot punch and die corp.

NORTH TONAWANDA, N. Y.



Will "automatic" ideas like these cut your costs?

THIS machine does two jobs at one time . . . does them thoroughly by power brushing . . . at the push of a button.

Perhaps a similar brushing method can help cut *your* costs, boost *your* production and improve the quality of *your* products,

The machine developed with the help of the **O**sborn **B**rushing **A**nalyst cleans steel-backed, babbitt-lined strip for production of automotive sleeve bearings. With the strip traveling continuously, Osborn Master® Wheel Brushes (A) remove all dirt, rust and metal particles from the steel surface. Osborn Monarch® Sections (B) then thoroughly clean the babbitt side.

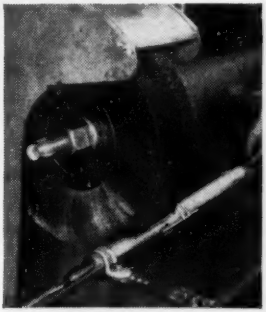
This is typical of the cooperation which your **O**sborn **B**rushing **A**nalyst can give *you* to solve problems of product cleaning, burr removal, roughing, polishing and finishing. For help, call or write *The Osborn Manufacturing Company, Dept. M-1, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

Osborn Brushes

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES



SAVES 12 MEN. This is one station of a five-station rotary automatic machine equipped with Osborn power brushes that removes burrs and sharp corners of clutch disc teeth. Formerly done by hand. Saves 12 skilled men.



9 TIMES AS FAST. This simple pipe fixture provides the means of cleaning threads of set screws. Can be applied to many cylindrical parts. Time was cut from 18 seconds to 2 seconds with this Osborn brushing idea.



10 TIMES AS FAST. This shows two gears before and after deburring by a new Osborn power brushing method. Note smooth uniform results. Time was cut from 3 minutes to 18 seconds.

You Can CUT COSTS in Cutting

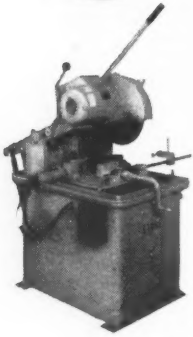
SHEET
PLATE
STRUCTURALS
ROD - BAR
TUBING
EXTRUSIONS

with

STONE HIGH-SPEED CUTTING MACHINERY

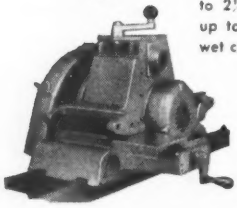
LOOK AT THESE TYPICAL CUTTING TIMES

ALUMINUM	2½" Dia. Rod	12 Seconds
ALUMINUM	1" Plate	5 ft. per min.
ALUMINUM	2" Dia. Tube	3 Seconds
BRASS	½" Dia. Rod	2 Seconds
COPPER	1¼" Dia. Rod	5 Seconds



MODEL M-75

A floor model, 2½' x 4' equipped with full 7½ h.p. geared-in-head motor engineered with positive drive, will cut all ferrous and non-ferrous solids up to 2½" — pipe and structurals up to 4". Can be equipped for wet cutting.

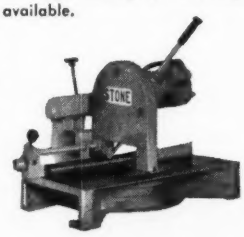


MODEL SS-20

Operates on guided rails for cutting larger structural steel, plate, sheet, with cuts up to nine feet in length. Cuts wet or dry.

MODEL M-14

32" x 34" Bench Model. This mighty little brute, with full 3½ h.p. geared-in-head motor engineered with positive drive, will cut all ferrous and non-ferrous solids up to 2" — pipe and structurals up to 2½". Two models — straight cut-off and swivel head for angle cutting to 45°. Legs available.



For complete information write to

STONE MACHINERY CO., INC.

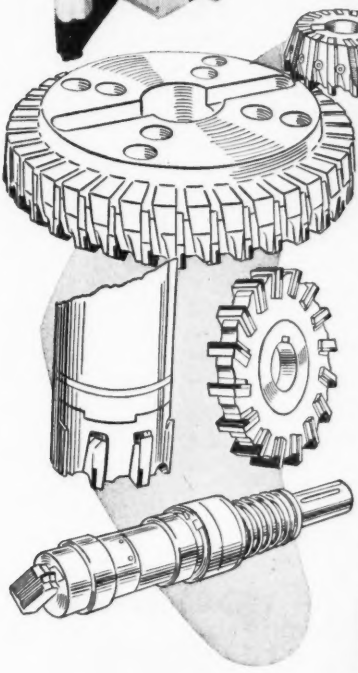
Fayette St. Manlius, N.Y.

INGERSOLL'S NEWEST



58-Spindle Process Machine

MILLS AND BORES 90 AUTOMOBILE CYLINDER BLOCKS PER HOUR



Seven kinds of milling cutters, together with boring tools and chamfering bars, fixtures and transfer equipment, were built by Ingersoll as integral parts of the process line pictured above.

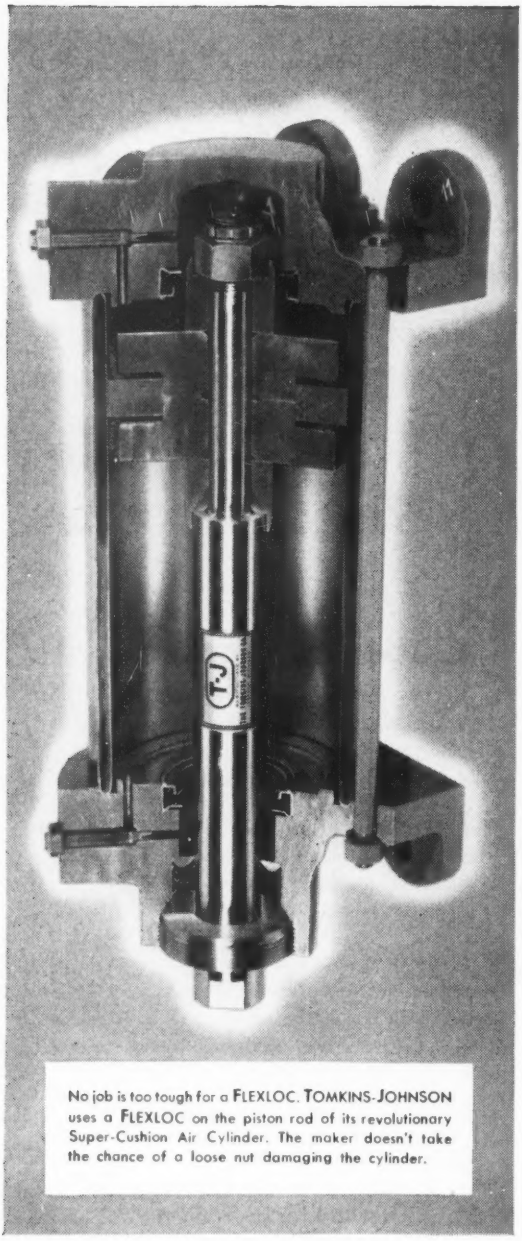
Working with our machine designers to meet exacting production and accuracy requirements of the automobile industry, Ingersoll's cutter engineers are continually improving basic tool designs.

Application of these advances to our standard inserted blade cutters makes higher feeds, longer tool life, and increased production available for all kinds of work on all makes of milling and boring equipment.

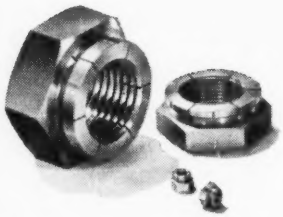


Write for
NEW INGERSOLL
Cutter Catalog 60A

THE INGERSOLL MILLING MACHINE CO., ROCKFORD, ILLINOIS, U. S. A.



No job is too tough for a FLEXLOC. TOMKINS-JOHNSON uses a FLEXLOC on the piston rod of its revolutionary Super-Cushion Air Cylinder. The maker doesn't take the chance of a loose nut damaging the cylinder.



What FLEXLOC locknuts do for you

FLEXLOCS eliminate complicated, time-consuming methods of locking threaded fasteners. They offer simpler, faster application and safer, more dependable locking than plain nuts and lockwashers, castellated nuts and cotter pins, or nuts and jam nuts. And they won't work loose.

The reasons for all this are plain. FLEXLOCS are one piece—nothing to assemble, come apart, lose or forget. FLEXLOCS are all metal—have higher tensile than most other locknuts and are not affected by temperatures to 550°F. FLEXLOCS are both stop and locknuts—don't have to seat to lock, and stay put anywhere on a threaded member as soon as their locking threads are fully engaged.

SPS can deliver any quantity of FLEXLOCS in a wide range of sizes. Stocks are carried by industrial distributors everywhere. Write for literature. SPS, Jenkintown 22, Pa.

FLEXLOC®

LOCKNUT DIVISION

SPS

JENKINTOWN PENNSYLVANIA

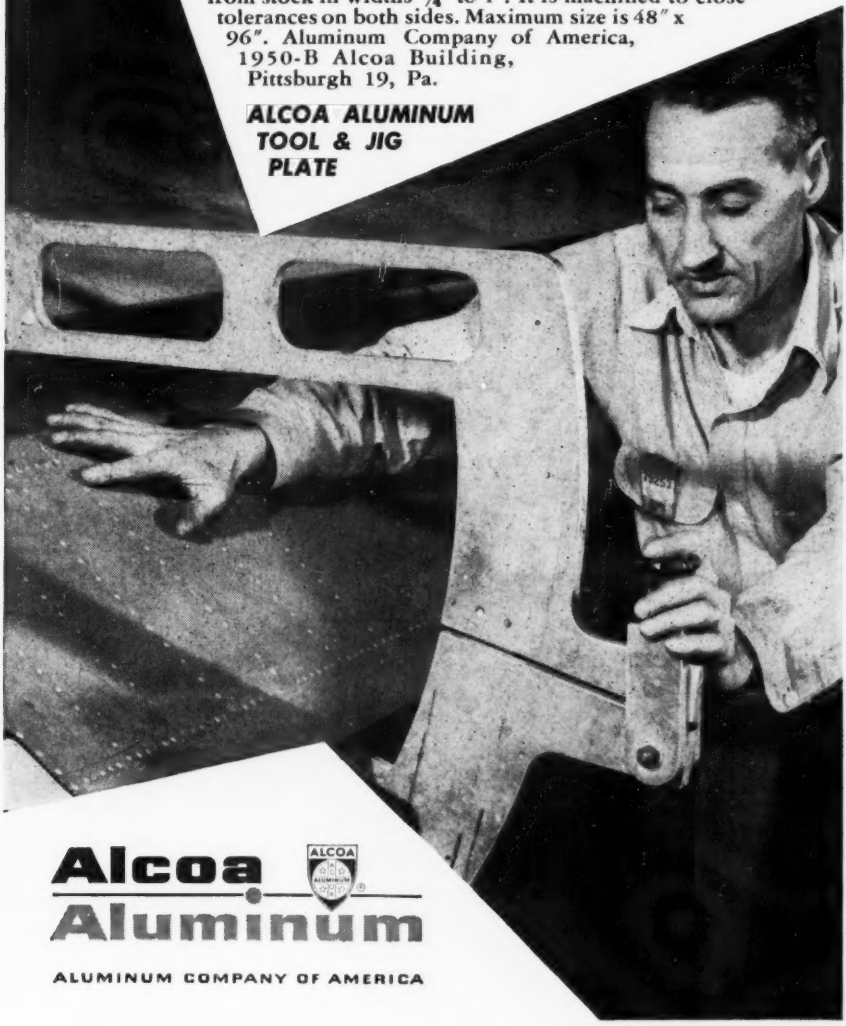
Our Fiftieth Year: A START FOR THE FUTURE

This Jig is easy to handle because it is made of aluminum (Alcoa Aluminum Tool & Jig Plate). It also costs substantially less than if it were made of steel because material costs are lower, and machining is faster.

Many manufacturers are using Alcoa Tool & Jig Plate for assembly and machining fixtures, dies for low-pressure molding of rubber and plastic, and dies for forming aluminum sheet.

Alcoa Tool & Jig Plate is a cast product, normalized, available from stock in widths ¼″ to 4″. It is machined to close tolerances on both sides. Maximum size is 48″ x 96″. Aluminum Company of America, 1950-B Alcoa Building, Pittsburgh 19, Pa.

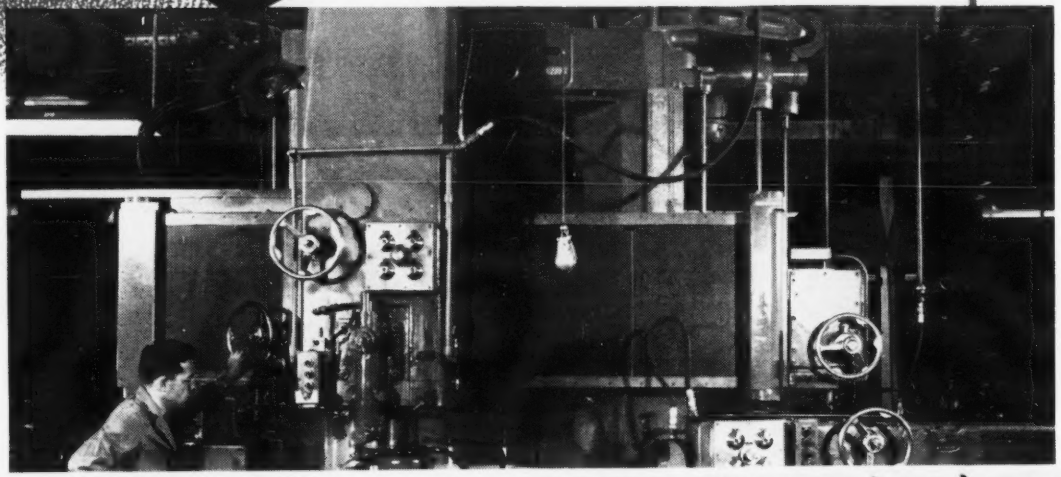
ALCOA ALUMINUM TOOL & JIG PLATE

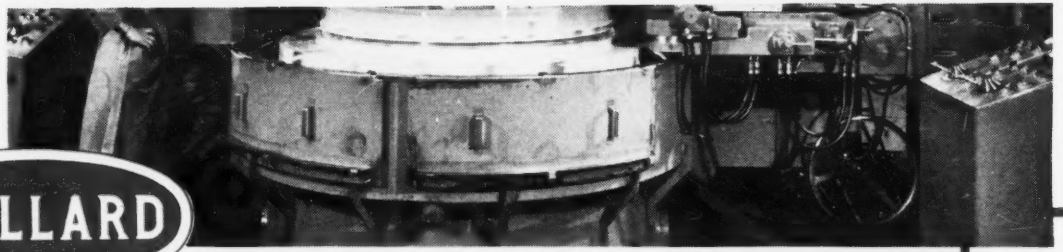


Alcoa Aluminum

ALUMINUM COMPANY OF AMERICA

NOW VERTICAL CHUCKING Grinders BY BULLARD





BULLARD

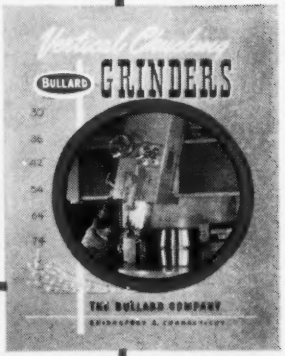
Bullard presents a carefully engineered and developed Vertical Chucking Grinding Machine in a range of sizes to meet present day requirements for conveniently grinding the larger sizes of work.

Years of study of field requirements for a truly accurate machine of this kind have produced this Vertical Chucking Grinding Machine now in production at the plant of TIMKEN BEARING CO. Canton, Ohio.

It is designed and built with Bullard characteristic Vertical Turret Lathe ruggedness and rigidity, combined with the sensitivity of control and built in precision so essential for successful grinding results.

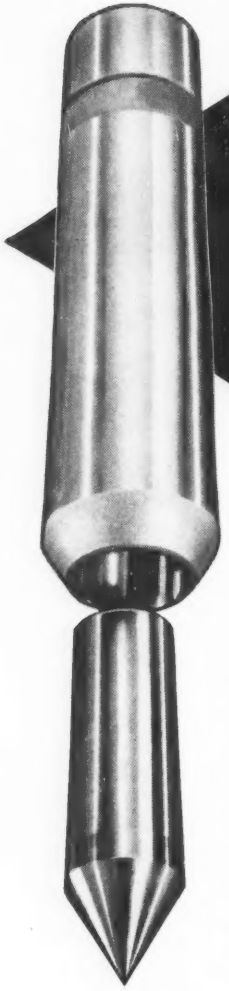
Precision, flexibility of control, safety design and productive efficiency place THIS LINE OF VERTICAL CHUCKING GRINDING MACHINES as an IMPORTANT item on your list for immediate investigation.

Write now for Delivery dates and complete information, ask for VG-6S.



THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT



INTOCO 2 PIECE CENTERS

. . . the answer to ALL your centering problems

INTOCO centers are of two-piece design, consisting of a shank and replaceable tip. Just 5 different sizes of tips when used with the proper size INTOCO shanks fit all sizes of Morse, Brown & Sharpe, and Jarno tapers.

Interchangeability of tips is an outstanding feature of the INTOCO line of 2 piece centers. These 5 tips are available in four different alloys to fit the many different applications . . . Cobalt Base Alloy, Nickel Base Alloy, High Speed Steel Alloy, Carbide.

INTOCO Tips are ground all over to give perfect concentricity and seating. To replace, you need only knock out the old and install the new. No special tools required. Write today for free 8 page catalog which gives complete specifications on this line of 2 piece centers.

INTOCO

INTOCO SALES CO.

distributors for INTERSTATE TOOL COMPANY

Engineers, Designers and Builders of Special Machinery, Plant Equipment and Tools

427 W. 58th ST. • CHICAGO 21, ILLINOIS

This man is running **SIX** *drill presses*



He is performing six consecutive drilling operations with a single jig at a single working station, with less handling time, and without changing tools. He is using the Lign-o-matic turret on a standard drill press.

PUT THE LIGN-O-MATIC TURRET IN YOUR SHOP FOR A FREE 10-DAY TRIAL . . . IT WILL . . .

INCREASE PRODUCTION — Many users report more than 300% greater output in actual production. Turret indexes faster than tools can be changed or work moved to another spindle.

CUT COSTS — patented self-centering principle guarantees accuracy equal to drill press spindle. Lign-o-matic reduces tool and jig wear, cuts worker fatigue: adds up to faster work with fewer rejects. All parts completely guaranteed for TWO YEARS against defective manufacture.

PRICE — Model D, 6 spindles with No. 2 Jacobs male taper $235.00

DELIVERY — Currently, 2 weeks.

TRY IT YOURSELF at our expense. If you are not fully satisfied for *any* reason, return turret within 10 days and pay nothing.



HOWE & FANT, INC. **540 FLAXHILL ROAD SO. NORWALK, CONN.**

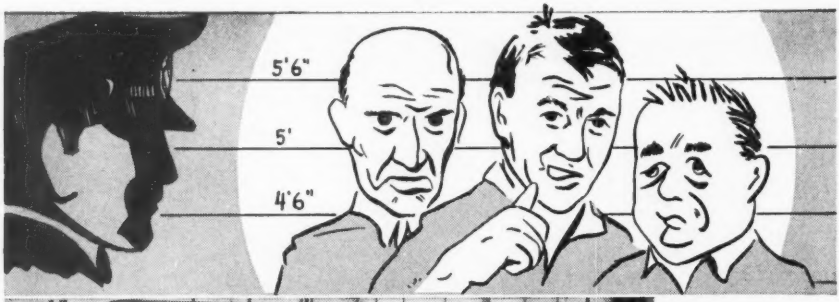
☐ Please rush ..... Lign-o-matic turrets for (drill press make) ..... (size) ..... (quill dia.) ..... (spindle taper) .....

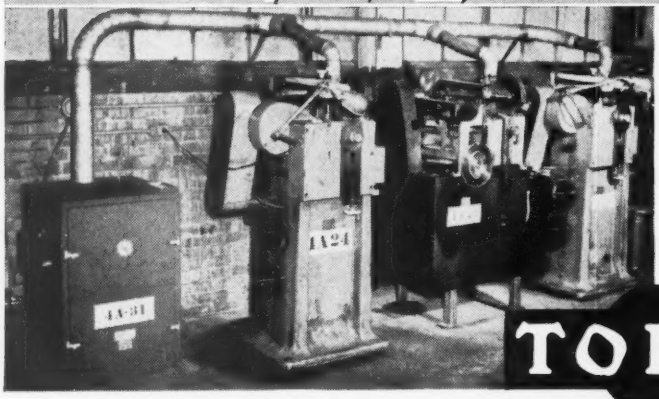
☐ Please send bulletin with complete information.

MY NAME _____

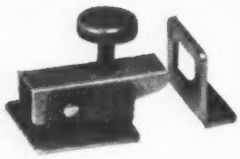
TITLE _____

(Attach coupon to company letterhead)





THIS LINE-UP COMES CLEAN WITH TORIT



TORIT DOOR FASTENER

The sturdy and efficient door fastener used on Torit cabinets is available for use on your own products. Strike plate either flat or angular. Write for quantity prices.

TORIT MANUFACTURING CO.
2 9 6 Walnut St., St. Paul 2, Minn.

DUST COLLECTORS

Here is a compact, efficient installation. One Torit Dust Collector and three saw filing machines. Note that there is no interference with operation or inspection of work, and practically no obstruction of the light source. Neither is any heat lost for Torit Dust Collectors return filtered air to the room.

This is another of the more than 25,000 installations where Torit Dust Collectors are giving complete satisfaction, cutting operating costs and improving working conditions. They are found in every kind of plant, from the smallest to the largest. If *you* have a dust problem it will pay you to contact Torit.

P.S. Ask for the latest Torit catalog.

UNION



Unretouched Photograph
by Morton Berger

Perfectly designed for its job . . . .

Union's long experience in the cutting tool field reflects itself in the excellent performance of every tool it makes.

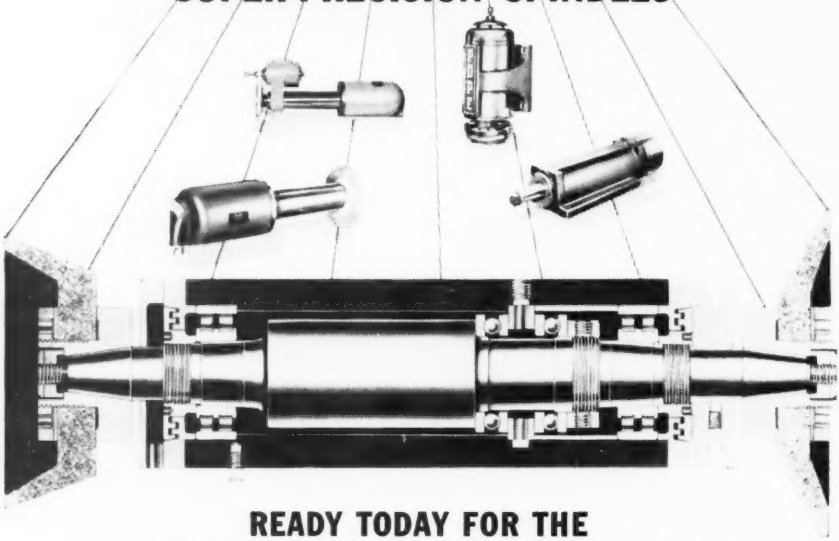
UNION TWIST DRILL COMPANY • ATHOL, MASSACHUSETTS

Milling Cutters **Gear Cutters** **Twist Drills** **Hobs** **Reamers** **Carbide Tools**

OWNERS AND OPERATORS OF: **S. W. CARD MANUFACTURING CO. DIVISION, Mansfield, Mass.** TAPS, DIES, SCREW PLATES
BUTTERFIELD DIVISION, Derby Line, Vermont DRILLS, TAPS, DIES, REAMERS, COUNTERBORES, SCREW PLATES
BUTTERFIELD DIVISION, Rock Island, Quebec MILLING CUTTERS, TWIST DRILLS, HOBS, REAMERS, TAPS, DIES, SCREW PLATES

POPE

SUPER-PRECISION SPINDLES



READY TODAY FOR THE GRINDERS AND MACHINE TOOLS OF TOMORROW

Indicator readings taken on the noses of thousands of POPE Super-Precision Spindles show less than one half of one ten thousandth (less than 50 millionths) of an inch of total eccentricity.

Whenever you want Precision Motorized or Belt Driven Spindles, in quantities of one, a hundred or more — whatever the kind of work you want to do — let us submit recommendations and estimates.

The SUPER-PRECISION Of Today Is The STANDARD Of Tomorrow

No. 87

POPE

TRADE MARK REG. U.S. PAT. OFF.

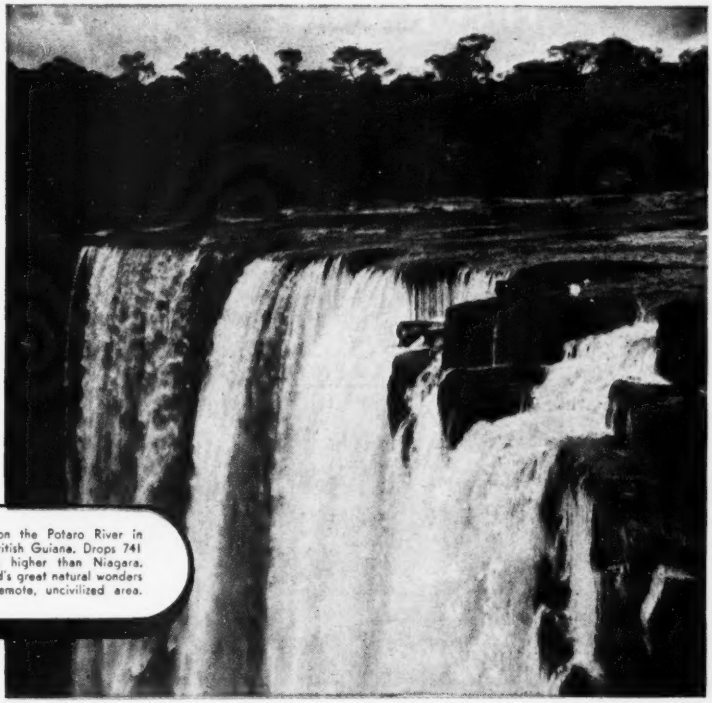
POPE MACHINERY CORPORATION

ESTABLISHED 1920

261 RIVER STREET • HAVERHILL, MASSACHUSETTS

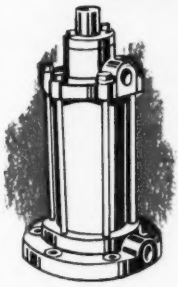
BUILDERS OF PRECISION SPINDLES

LOGAN FLUID POWER • DURABLE, DEPENDABLE SINCE 1916



Kaieteur Falls on the Potaro River in West Central British Guiana. Drops 741 feet—five times higher than Niagara. One of the world's great natural wonders situated in a remote, uncivilized area.

LOGAN HYDRAULIC CYLINDERS



750 SERIES
NONROTATING TYPE
7 STANDARD MOUNTINGS

Eight standard sizes from 2" to 8" diameter bore. Maximum operating pressure 750 p.s.i.

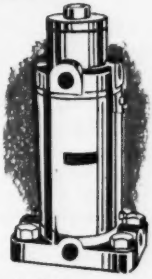
ROTATING "HR" TYPE

Seven standard sizes from 3" to 14" diameter bore. Maximum operating pressure 500 p.s.i.

ROTOCAST® SERIES
7 STANDARD MOUNTINGS

Sizes from 2" to 8" bore; any length stroke up to 8 feet as standard. Four piston rod end types. Operating pressures to 1500 p.s.i.

Consult Logan for your special heavy-duty, mill-type cylinder requirements



LOGAN MANUFACTURES 6,975 STANDARD CATALOGED ITEMS

FREE CATALOG ON REQUEST

AIR CONTROL VALVES, Cat. 100-4 . AIR CHUCKS, Cat. 70-1 . AIR CYLINDERS, Cat. 100-1 . AIR-DRAULIC CYLINDERS, Cat. 100-3
AIR and HYDRAULIC PRESSES, Cat. 51 . COLLET GRIP TUBE FITTINGS, Cat. 200-5 . HYDRAULIC CONTROL VALVES, Cat. 200-4
HYDRAULIC CYLINDERS, Cats. 200-2; 200-3 . HYDRAULIC POWER UNITS, Cat. 200-1 . SURE-FLOW COOLANT PUMPS, Cat. 62

SAVES TIME — Logan — AIR AND HYDRAULIC EQUIPMENT — EFFORT-MOTION

LOGANSPORT MACHINE CO., INC., 901 CENTER AVE., LOGANSPORT, IND.

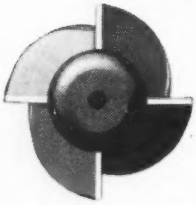
AN IMPROVED STANDARD COUNTERBORE DESIGN by ECLIPSE

NEW!

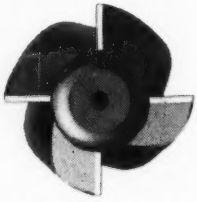
FLUTE DEVELOPMENT GIVES YOU

★ *Deep* counterboring with a *wider range* of pilot sizes.
★ A higher helix angle which assures *faster chip disposal.*
★ New tooth construction thus providing maximum *heat dissipation.*

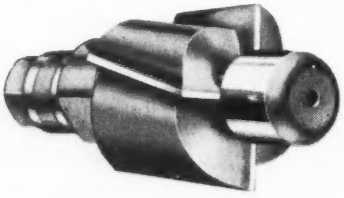
The DIFFERENCE at a glance!



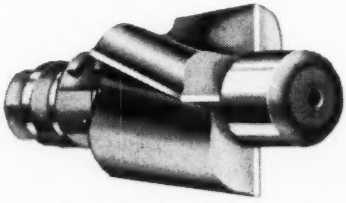
End view of counterbore showing conventional flute form, designed for spot facing and *shallow* counterboring.



New style flute form designed for spot facing and *deep* counterboring, chips can flow freely from pilot diameter.



Side view of counterbore showing conventional flute design which provides ample chip clearance for shallow counterboring and spot facing.



New style flute form with increased helix angle permitting faster chip removal, thus reducing heat to a minimum in deep counterboring.

Our present stock is being replaced with the new design as rapidly as possible so that in the very near future all orders will be filled with this later design within the range of sizes provided.

ECLIPSE COUNTERBORE CO.

Founded in 1913

DETROIT 20, MICHIGAN

Avey

AUTOMATIC UNITS

for Drilling • Tapping • Reaming • Hollow Milling and Deep Hole Drilling

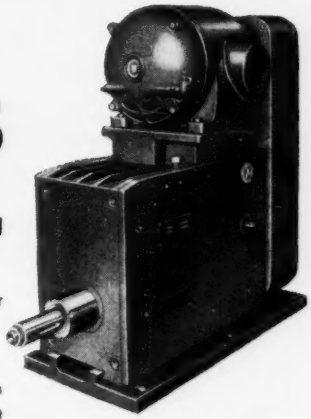
Vertical, Horizontal or Angular Mounting

Units are universal in application . . . let us show you their application to your job.

Made in two sizes—No. 1 and No. 2 Morse Taper.

This simple unit gives high production at a lower cost. When used in multiples to complete operations, no relocation of part is necessary, thus producing more accurate work.

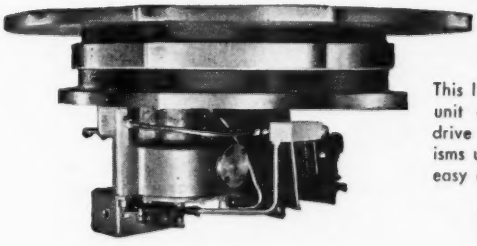
Semi-skilled operators will deliver high production accurately and efficiently, yet with a minimum of supervision.



Here is a packaged unit that will simplify your **HIGH PRODUCTION PROBLEMS**

AUTOMATIC INDEX TABLE

Meets Demand For Drilling and Tapping Equipment



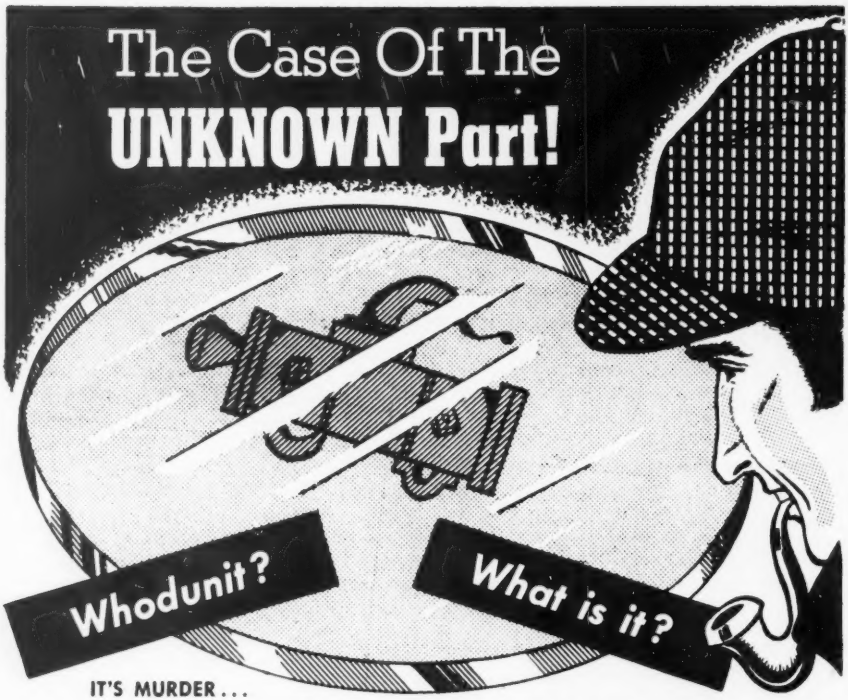
Made in sizes 16", 20", 24", 30", and 36" diameter. Indexes, 3 to 12 stations.

This Index Table is a self-contained unit, built on unit construction principle and includes motor drive assemblies. All drive and control mechanisms underneath table for free work surface . . . easy accessibility.

Consult the yellow pages in your phone book —under Machine Tools—for our nearest representative, or write direct to our factory.

THE Avey DRILLING MACHINE CO.
Cincinnati 1, Ohio

The Case Of The UNKNOWN Part!



IT'S MURDER . . .

. . . for your customers to try to reorder metal parts which aren't properly marked.

And it blackjacks your production, too, when your components can't be identified *instantly.*

SOLVE THE MYSTERY—
Mark 'Em for Profit . . .

. . . with impressions that help you in a hundred ways! Your name, model number, part number, operating instructions, decorative designs and other information can be ROLLED legibly and *permanently* into all of your metal products. It's quick, easy and *profitable!*

GTS

FREE MARKING ADVICE

Simply send prints or samples of parts to be marked, together with exact lettering and its location, for free recommendations.

WRITE FOR FREE CATALOG . . .

. . . It will help you choose the marking equipment—from hand stamps to marking machines—that will suit your *exact* needs.

CASE CLOSED By

If It's Worth Making—It's Worth Marking. If It's Worth Marking—Mark It Well.

GEO. T. SCHMIDT, INC.
1806 West Belle Plaine Avenue
Chicago 13, Illinois

USE

Palmer-Shile AIR SAVER *Leak Proof* AIR VALVE

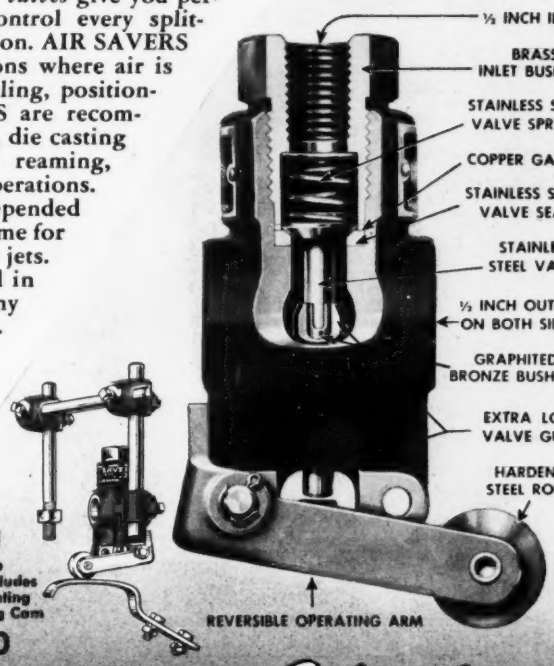
TO *Get Split-second Air Control!*

FOR MAXIMUM MACHINE TOOL EFFICIENCY

50975
(Valve Alone)
$13.20

PALMER-SHILE *Air Saver air valves* give you perfect, leak-proof air power control every split-second of machine tool operation. AIR SAVERS are ideally suited to applications where air is used for cleaning, drying, cooling, positioning or ejecting. AIR SAVERS are recommended around punch presses, die casting machinery, drill presses, in reaming, broaching and many other operations. AIR SAVERS may always be depended upon to provide ample air volume for operation of single or multiple jets. AIR SAVERS may be mounted in any position, to operate at any angle unaffected by vibration. MANUFACTURERS AND OPERATORS: for split-second air control and maximum machine tool efficiency, build Air Saver air valves into your new machines. Or install Air Savers in machines you now have in operation.

Immediate Delivery



50801
Complete Assembly includes Valve, Mounting Rods, Operating Cam
$16.50

Palmer-Shile Co.

16022 FULLERTON AVE. • DETROIT 27, MICH.



This Man Knows How To

CUT COSTS TO THE CORE
SPEED ASSEMBLY JOBS
MEET URGENT SCHEDULES
RELEASE MANPOWER
FOR MORE IMPORTANT WORK

He Uses DPS Power-Driven Assembly Equipment

HOPPER UNITS

Motorized . . . Selects and feeds Screws, Screw Blanks, Rivets, Pins, Nuts, Discs, Washers, etc. in a given position for primary and secondary operations. Eliminates manual handling of parts. Highly adaptable to Presses, Centerless Grinders, Thread Rolling and Slotting Machines and Special Machines.



POWER SCREWDRIVERS

An absolute necessity in present-day production assembling. Will drive screws as fast as one a second—no marring of heads or stripping threads . . . All screws driven to uniform tension. Hopper fed . . . SCREWS ALWAYS IN SIGHT OF OPERATOR. 3 models to fit varying requirements.



You Can Benefit Likewise: Your First Step Is to Mail This Coupon

DETROIT POWER SCREWDRIVER CO.
2807 WEST FORT ST., DETROIT 16, MICHIGAN

Send your catalog and further details.

Company Name_____

By_____

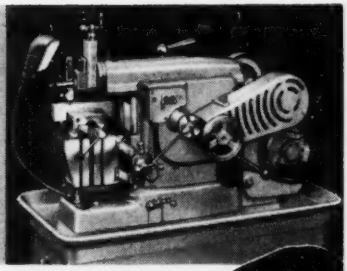
Street Address_____

City_____ State_____

DETROIT POWER SCREWDRIVER CO.

South Bend 7" Shaper

FAST • EFFICIENT • ECONOMICAL!

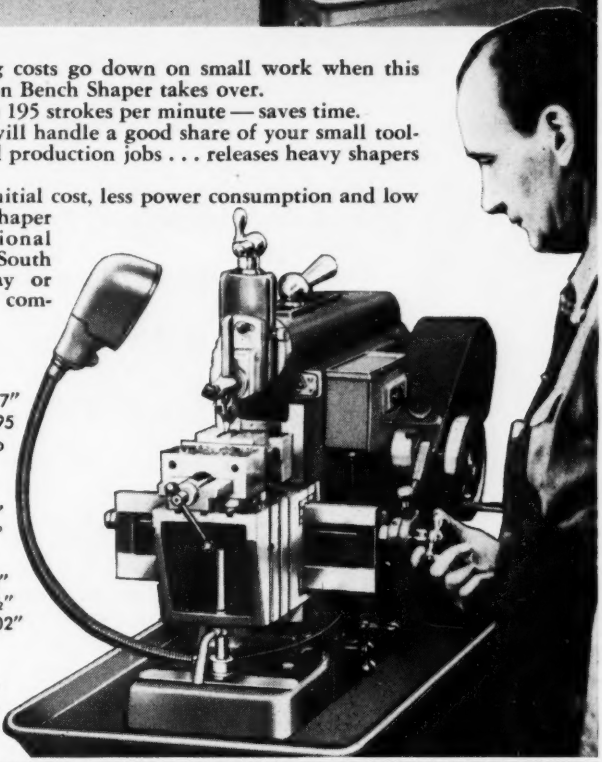


Watch your machining costs go down on small work when this South Bend 7" Precision Bench Shaper takes over.

FIRST, its speed — 42 to 195 strokes per minute — saves time.

SECOND, its 7" stroke will handle a good share of your small toolroom, maintenance and production jobs . . . releases heavy shapers for larger work.

THIRD, with its small initial cost, less power consumption and low upkeep, this versatile shaper can save you additional money. Call your local South Bend distributor today or send the coupon for complete information.



SPECIFICATIONS

RAM

Stroke length . . . . 0 to 7"
Strokes per min. (4) 42 to 195
Cutting speeds . . . . 3 to 114 feet per minute

TOOL HEAD

Vertical travel . . . . . 3"
Head swivels . . . . 360°

TABLE

Vertical travel . . . . . 5"
Horizontal travel . . . 9½"
Power cross feeds (6) .002" to .012" (reversible)

VISE

Maximum opening . . 4"
Jaw width . . . . . 4"
Jaw depth . . . . . 1"

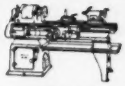
SEND INFORMATION CHECKED:

☐ _____



☐ TOOLS & ATTACHMENTS

☐ 9" and 10" BENCH LATHES



☐ 10" to 16-24" FLOOR LATHES



☐ ½" and 1" Collet TURRET LATHES



☐ 14" DRILL PRESSES



☐ 7" BENCH SHAPERS

Name _____ Company _____

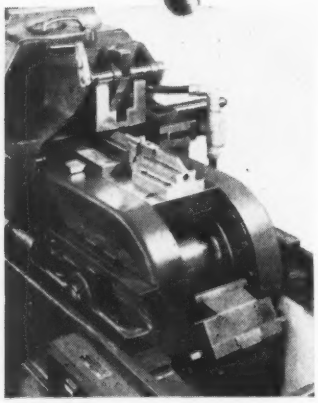
Street _____ City & State _____

Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana



TO CUT MACHINING COSTS

machine faster with continuous broaching



Holding fixtures are designed for quick, convenient loading, with automatic clamping and unclamping.

● Many types of work can be surface broached on Footburt machines at remarkable savings over previous machining methods. High production is obtained with required accuracy and finish. Cutting tool maintenance costs are low. We will be glad to make our recommendations on Footburt Surface Broaching Machines based on our many years in handling similar work.

THE FOOTE-BURT CO. • **Cleveland 8, Ohio**
Detroit Office: General Motors Building

FOOTBURT
machine tools



More than 30 years' *past* experience in supplying diemakers' needs has taught Danly how to foresee *future* needs. In almost every instance, there are *standard* Danly Die Sets and *standard* Danly Diemakers' Supplies to meet your diemaking specifications.

You can rely on Danly's reputation for precision and dependability when you start your tooling program. You can be sure of prompt delivery from completely stocked Danly branch assembly plants located in nearly every major toolmaking center.

So save tooling time . . . get into production faster . . . insure longer production runs . . . with Danly Die Sets and Danly Diemakers' Supplies.

FAST, COMPLETE SERVICE!

DANLY

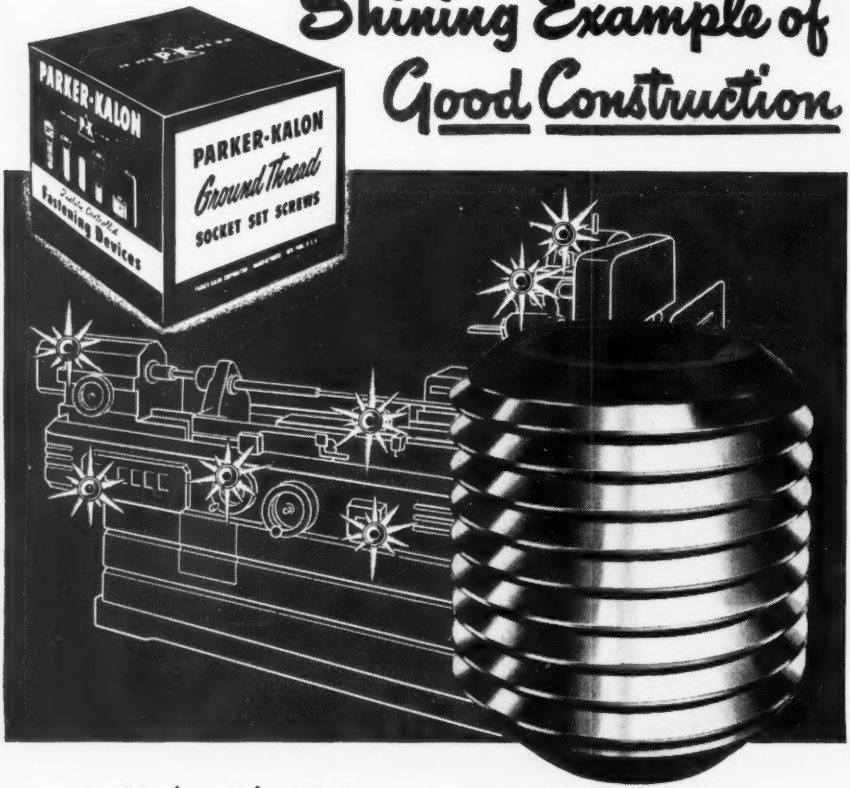
DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue
Chicago 50, Illinois

A NATIONWIDE BRANCH PLANT SYSTEM

***CHICAGO** 50	2100 South Laramie Avenue
***CLEVELAND** 14	1550 East 33rd Street
***DAYTON** 7	3196 Delphos Avenue
***DETROIT** 16	1549 Temple Avenue
***GRAND RAPIDS**	113 Michigan Street N.W.
INDIANAPOLIS 4	5 West 10th Street
***LONG ISLAND CITY** 1	47-28 37th Street
***LOS ANGELES** 54	Ducommun Metals & Supply Co., 4890 South Alameda
MILWAUKEE 2	111 East Wisconsin Avenue
***PHILADELPHIA** 40	511 W. Courtland Street
***ROCHESTER** 6	33 Rutter Street

**Indicates complete stock*

Shining Example of Good Construction



good judgment calls for

PARKER-KALON®

when good design calls for

SOCKET SCREWS

DELIVERIES ARE BETTER CHECK WITH P-K FIRST



Your P-K DISTRIBUTOR *has good news. His stocks of P-K Screws are steadily improving. The size and type you need may now be readily available. Ask about it. Remember—"If it's P-K . . . it's O.K."*

Whether you make simple jigs and fixtures or giant machine tools, assembly with P-K Ground Thread Socket Set Screws will reflect superior construction throughout. Any buyer associates topmost quality with their super-smooth, gleaming *ground thread* finish.

This sales-feature is only one advantage. Assembly moves faster, too. Workers like their clean, burr-free contour, their easy keying, their dependable Class 3 Tolerance.

Ask for samples. See why P-K Ground Thread Socket Set Screws will put your product out in front, assembly-wise and sales-wise. Parker-Kalon Corporation, 200 Varick St., New York 14.

SIZE-MARKED CAP SCREWS • GROUND THREAD SET SCREWS • FLAT HEAD CAP SCREWS • STRIPPER BOLTS • PIPE PLUGS • HEX KEYS

A "make or break" operation

VERY OFTEN when a part reaches a Warner & Swasey Precision Tapping and Threading Machine, nearly all the required machining has been done. Now all that remains is accurate tapping to proper depth, and the piece is ready for inspection and shipment, or further assembly.

Most of these are precision jobs that must meet Class 3 fits or better. In blind holes, uniform depth tolerances must be maintained. Inaccuracies now would mean a rejection of the piece, and the loss of all the previous time-taking machining operations.

It is because these final tapping or threading operations *are* such "make or break" operations that more and more manufacturers are turning to Warner & Swasey Precision Tapping and Threading Machines. Warner & Swasey's positive lead screw principle, with solenoid-actuated guide fingers to lead the tap in and out of the work, reproduces the accuracy of the tap itself—eliminates any chance of thread inaccuracies caused by drag or backlash.

Where your schedules demand precision tapping on a production scale, call in our Field Engineer and have him show you how a Warner & Swasey can help you speed up your production.



YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

UNEQUALLED
for safe, hard blows

C/R JAW-HEAD



A perfectly balanced tool. Tough, resilient water buffalo rawhide faces deliver needed power, yet protect fine finishes and delicate parts. Faces quickly and easily replaceable. Safety-Flare handle gives comfortable grip and prevents slipping. When you need a "soft" hammer, make sure it's a C/R *Rawhide* Jaw-head.

Faces replaced in seconds

Merely loosening a nut releases jaws for replacing faces. When nut is tightened, faces are held in a vise-like grip.

Available from leading industrial suppliers. Also C/R Rawhide mallets, mauls, solid head hammers.

For further information write Dept. 22

CHICAGO Rawhide MFG. CO.

1301 Elston Ave., Chicago 22, Ill.

Canadian Distributor: Super Oil Seal Mfg. Co., Ltd., Hamilton, Ontario

POSITIVE DRIVE... QUICK CHANGE



with Continental Counterbores...

CTW

You can reduce your tool cost, improve accuracy, and increase production with the Continental complete line of standard drive interchangeable cutting tools. Cutters have a balanced, indestructible drive—originated by Continental—that will not stick, will not break, and is hand detachable after toughest cuts.

Order through your local Ex-Cell-O representative or write to Continental in Detroit.



CONTINENTAL TOOL WORKS

Division of Ex-Cell-O Corporation

DETROIT 32, MICHIGAN

over the editor's desk

Introducing Quality Control

Sir:

The March 1952 issue of MODERN MACHINE SHOP included an article by Earl Lamm, Engineering Economics Division, Battelle Memorial Institute, entitled "Introducing Quality Control to Shop Personnel."

We feel that Mr. Lamm has presented an excellent picture of Quality Control particularly in regard to early mistakes which now hinder the development of a Quality Control Program and his description of what a good Quality Control Program is supposed to do and how it is supposed to do it.

We would like to have a few copies of this article if they are available or permission to reproduce it for our own use with due recognition to the author and to the publication in which it appeared.

J. C. Dolan
Quality Control Department
Ford Motor Company
Parts and Equipment Manufacturing Division
Ypsilanti, Michigan

Mr. Dolan's letter reminded us that we have a limited supply of reprints of this article in our files. Readers who would like to have a copy may obtain one by writing to us. They will be available as long as the supply lasts. No charge.—Ed.

Weldments in Tool Construction

Sir:

We have had 10,000 reprints made of your article "Weldments Find Favor in Tool Construction" which appeared on Page 140 of the November issue. Under separate cover, I am sending you several hundred copies in order that you may supply requests which are sent directly to you.

C. G. Herbruck
Assistant to Secretary
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Cleveland, Ohio

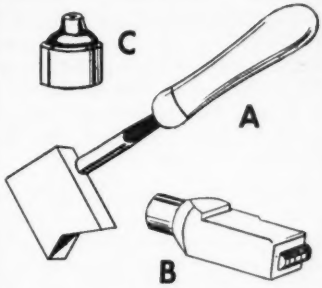
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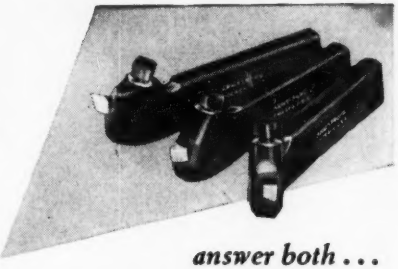
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MODERN Machine Shop

Vol. 25, No. 9
FEBRUARY, 1953

features in this issue

Designing and Building Arc Welding Fixtures — ***By H. G. Frommer***

Mr. Frommer explains several basic ideas which should be kept in mind when called upon to build a fixture for a welding operation and then goes on to point out several welding setups in his own shop that were helpful in obtaining good results and savings in time and material. Page 114.

It Pays to Pay Attention to Fundamentals — ***By C. W. Kennedy***

The author discusses common errors frequently found in the use of gaging instruments and how these errors may be eliminated to reduce scrap, rework, and rejections. Page 130.

Nitriding as a Production Tool, Part I — ***By Lester F. Spencer***

As chief metallurgist of Landers, Frary & Clark, the author speaks from experience in this discussion of the nitriding process and the materials on which it may be used. Page 146.

Efficient Shop Promotions — ***By Gilbert C. Close***

In this article, Mr. Close tells how North American Aviation solves the difficult job of selecting the right shop employee from among hundreds for promotion to a higher level job. Page 164.

Die Plate Calculation — ***By Federico Strasser***

An experienced die maker will usually determine the dimensions for a die plate based upon his judgment and practical experience, supplemented by certain machine design principles. In this article, the author presents for the beginner a simple method for use in the calculation of die plates. Page 174.

Analyzing Business Regulations — ***By Robley D. Stevens***

The figuring of overtime pay for employees in the machine shop is the basis of this article by Mr. Stevens. Several methods of computing this type of payment are discussed. Page 184.

Case History No. 1—Machining Stainless Steel — ***By G. J. Stevens***

Beginning of a series in which the author discusses the solution to machining problems based on his own personal experience. Page 208.

Designing and Building Arc Welding Fixtures

By H. G. Frommer

In this article, the author discusses three classes of welding fixtures; namely, tacking, welding and holding fixtures.

WHEREVER individual parts are joined together to form a weldment, welding fixtures are required for production economy, for uniformity, and for control of important dimensions. The three main divisions into which welding fixtures can be classified are: (1) tacking fixtures, also known as "setup" or "fitup" fixtures; (2) welding fixtures; and (3) holding fixtures.

Tacking Fixtures

Tacking fixtures serve the only purpose of locating integral parts in correct relation to permit the operator to "tack" them together. The tack assembly is then removed from the fixture and welded in a separate facility. Since very little strain occurs through the few and short tack welds, such fixtures do not have to be of especially strong construction.

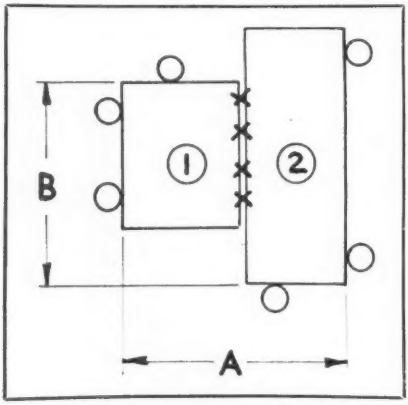


Fig. 1—Fixed locating pins, as shown here, should never be used due to the difficulty encountered in removing weldment.

Welding Fixtures

A welding fixture is a tacking fixture in which the parts can be welded instead of just tacked. This type of fixture, of course, is preferred to the tacking fixture because its use eliminates two handling operations, one move, as well as a clamping and unclamping operation. It is often impractical to use welding fixtures for intricate or complex weldments as the positioning of such fixtures for the various welds is difficult, if not impossible. For this reason, the usual practice is to tack parts in a tacking fixture and then use a simple holding fixture in connection with a hand-operated or power-driven welding positioner.

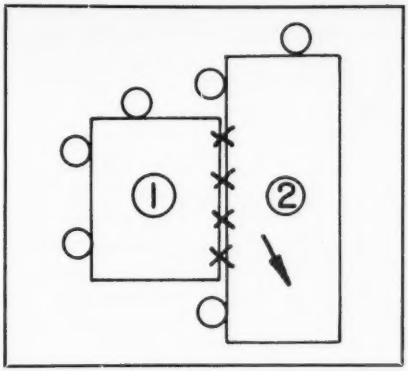


Fig. 2—Correct method of arranging fixed locators. Locators should always be positioned on the same sides of all component parts so that weldment can be moved slightly in the direction of the arrow before it is lifted out of the fixture.

Holding Fixtures

A holding fixture is a device to hold already tacked weldments to positioners for the final welds. These fixtures are occasionally built so as to resist strains and distortion brought on by heavy welding. Obviously, this classification is very general. Occasionally, variations or combinations of fixture types can be made; a tacking fixture fastened to a welding positioner may afford excellent results, provided the fixture is built heavy enough to resist weld distortion, clamps and locators are placed so there would be no interference between them and the welding electrode, and finally, the loading of the fixture with parts (if mounted on a larger positioner) is not too cumbersome or unsafe.

The choice of fixture type is often influenced by the type and quantity of equipment and machinery available for the job, as well as by production requirements, balance of tacking and welding times, and the tooling budget. For instance, if available positioner time is scarce, the plans may call for a tacking fixture and a holding fixture in order that the time required for loading the integral parts and their individual clamping may be done at a different station so that the positioner is used for the actual welding only. Or, if a tacking fixture is complex and therefore rather costly, one may want to use it for tacking only rather than for tacking and welding if production requirements are so high that a second tacking fixture would be required should the welding be done in it also.

There are almost as many solutions as there are problems; each case must be analyzed thoroughly and, after full consideration of all factors, the final decision can be made. This article, however, can serve as a guide by comparison and by proper usage of the principles of design and building of welding fixtures as outlined and illustrated.

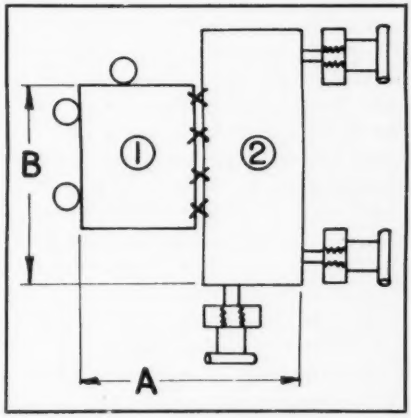


Fig. 3—When dimensions "A" and "B" are critical and must be maintained accurately, fixed locators should be replaced by retractable locators, as shown here.

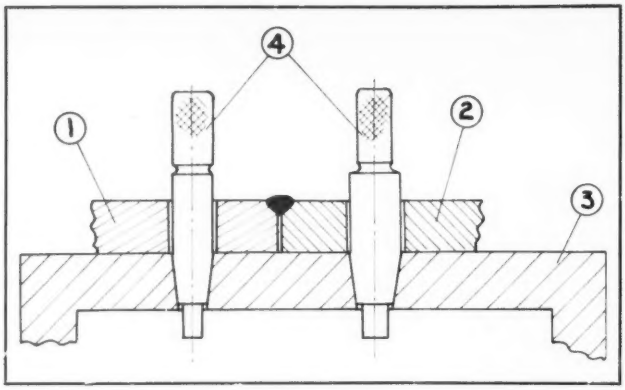


Fig. 4—Drawing showing one method of locating two plates through predrilled holes.

unloaded by cranes and hoists and thereby are in danger of being damaged.

During the welding of fixtures, severe stresses are set up within the structure. If, therefore, a welding fixture is machined and put in operation without the benefit of thorough stress relieving, the heat generated later on by the welding of parts is transferred into the fixture, thereby relieving the stresses set up originally. This, of course, renders the fixture inaccurate and unreliable.

There are many advantages to the sectional construction of a large welding fixture. First of all, the efficient manufacture of such a fixture may demand it to be designed in sections. Engineering changes of the product that is produced can be taken care of easier by a change of the affected section rather than by a change of the whole fixture. Also, repairs may be effected easier and faster.

The Structure of Fixtures

One of the main problems facing the designer when he attempts to build an efficient tacking or welding fixture is the construction of the fixture body. The past fifteen years have seen a switch from cast iron to welded construction in almost all types of fixture design. Especially larger welding fixtures are now almost universally made by the welding of structural shapes and plates together to form the main body. Sub-assemblies, also of welded construction, are machined and then fastened to the body. Nevertheless, when fabricated and cast fixtures are compared, this old statement is often revived: "We should have cast iron here for greater stiffness." However, the fallacy of this remark is made obvious by investigation of the physical characteristics. The modulus of elasticity of steel, which is a measure of rigidity, is over two times that of ordinary cast iron. The tensile strength of steel is up to five times greater, and steel will almost take five times the impact load for equal sections. Resistance to impact is very important as large welding fixtures are loaded and

Locators, Rests, and Clamps

Besides the main body as already described, the average welding fixture consists only of locators, rests, and clamping devices. This may sound overly simple, but if one remembers that rests, locators, and clamps are usually required for each component part of the weldment, it can readily be

seen that fixtures for larger weldments can become rather complex, and the loading of all parts may well be time consuming unless sufficient labor-saving and time-saving devices are employed. Quick-acting clamps and simple, non-binding locators are the prime requisites of good fixture design.

Unlike drill jigs, milling fixtures, or other machining fixtures where the workpiece is essentially the same at loading and at removal, the welding fixture has the additional problem of binding of the work at removal. Several parts that are located individually are welded together. If all locators are not placed in proper relation to each other, it is often difficult to remove the weldment because workpieces may be forced against the locators by expansion, contraction, or distortion due to welding. Figures 1, 2, and 3 show the very principle of locating within a welding or tacking fixture. Two plates, (1) and (2), are welded together as shown by the "x" symbols. Fixed locating pins, as shown in Fig. 1, should never be used, as removal of the weldment is extremely difficult and time-consuming. Figure 2 shows the correct solution; fixed locators should always be positioned on the same sides of all component parts so that the weldment can be moved slightly in the direction of the arrow to clear the fixed locators before it is lifted out of the fixture. If, however, dimensions "A" and "B" are critical and must be maintained accurately, fixed locators should be replaced by retractable ones, as shown in Fig. 3.

One of the simplest types of retractable locators is the threaded shoulder pin. An upright post of the fixture is drilled and tapped, and a surface away from the workpiece is finished. A threaded shoulder pin with a T-handle is then inserted. When the shoulder of the pin is turned against the finished surface of the upright, the front end of the pin acts as a locator. Obviously, the designer must coordinate the length of shoulder pin (tip to shoulder) with the finished surface of the upright. The designer should think twice before using threaded locating or clamping devices on welding fixtures as weld spatter invariably damages unprotected threads. Anti-spatter compound helps somewhat but it must be applied repeatedly to be effective. Threaded devices should be designed

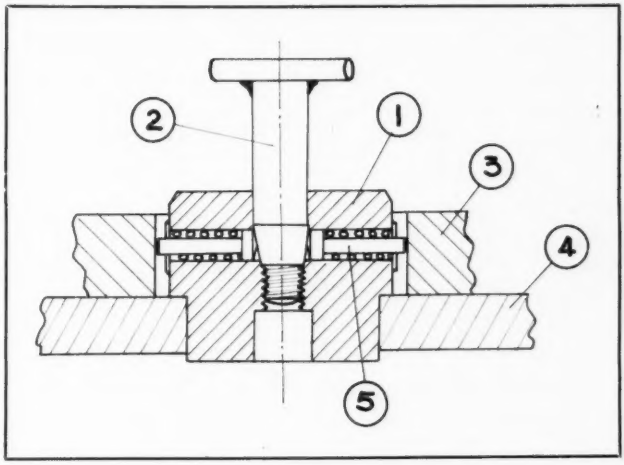


Fig. 5—Drawing showing a method employing expanding pins for use in locating plates through predrilled holes.

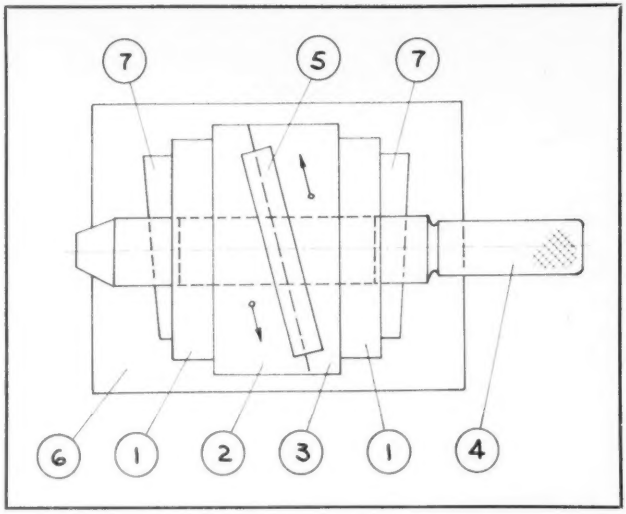


Fig. 6—Drawing showing a releasing wedge-type locator designed for locating drilled lugs.

so that no threaded portion is unprotected during any tack or weld operation.

The design of fixed locators is no different here from the designs used on machining fixtures. There is always the choice between fixed and "adjustable-fixed" locators. The latter are usually screws or bolts that must be set up at first production and then locked with a lock nut. They have the advantage of lower fixture cost and ease of readjustment. The latter advantage, however, sometimes turns into a disadvantage because the operator may be tempted to readjust the fixture without the approval of the inspector or foreman. Fixed locators are often preferred as they too can be changed easily if designed properly. A round locating pin can be turned down to a smaller diameter, or a bushing can be pressed on it to enlarge the diameter.

Locating through predrilled holes is often tricky as the weld operation forces the workpiece against such locators and makes removal difficult. Figure 4 shows one way of locating two plates, (1) and (2), from one hole each. The fixture is provided with tapered holes at the correct spacing. Two pins (4) are made to fit the tapers

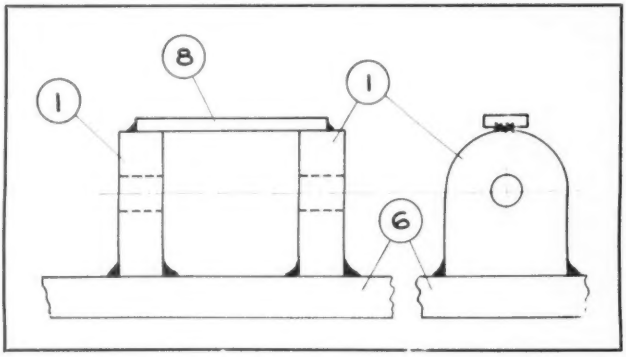


Fig. 7—Drawing showing method of tacking temporary brace to unsupported drilled lugs.

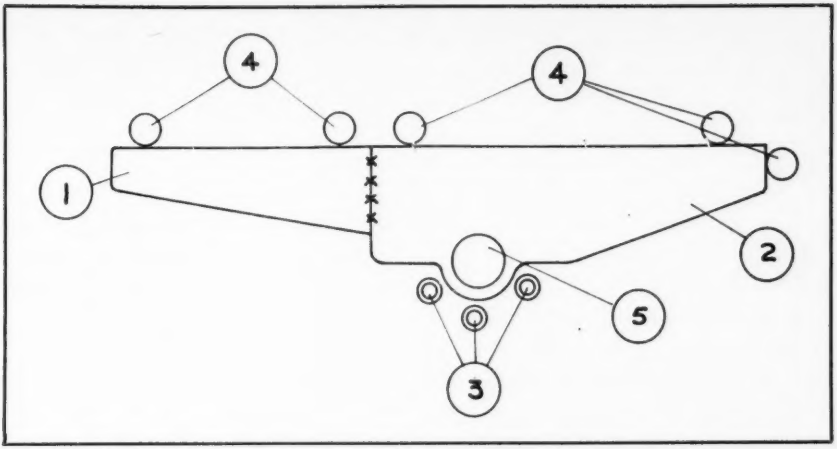
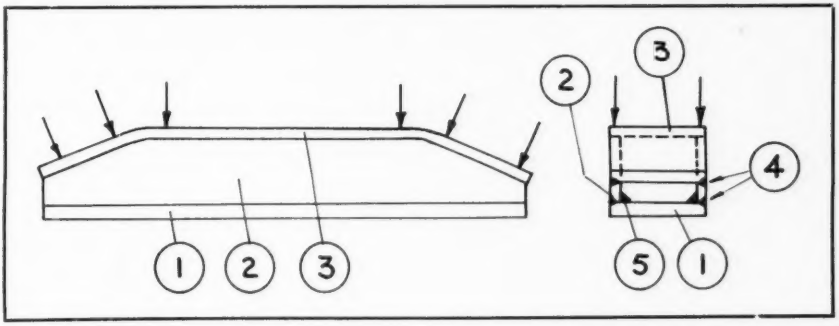


Fig. 8—Drawing showing method of employing checking pins in conjunction with tacking or welding fixtures.

as well as the holes of the workpieces (1) and (2). After the tacking or welding is completed, pins (4) are tapped slightly from the bottom up. As soon as the tapers disengage, the pins are free to follow the now slightly displaced holes of the workpieces and, therefore, the latter are removed easily.

There are many other ways of locating through holes, expanding pins being another solution, an example of which is shown in Fig. 5. Fixture base (4) receives pin (1) which is drilled and tapped at the bottom and provided with a larger bore near the top. Expander pin (2) has a tapered portion that forces three or four lock pins (5) outward until they centralize the hole of workpiece (3). After welding, springs return the lock pins after the expander pin is unscrewed to allow for

Fig. 9—Illustration showing a box section designed for use with hydraulic clamping.



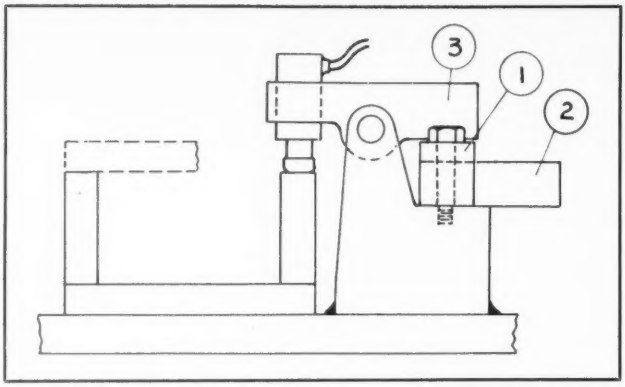


Fig. 10 — Illustration showing arrangement of backup bars which facilitate clamping operations on box sections.

easy removal of the weldment.

The locating of drilled lugs and, at the same time, holding a critical dimension between them can be done effectively with a releasing wedge-type locator, as shown in Fig. 6. A steel block, machined to the critical spacing (plus cutter width, as explained later) is bored to the same diameter as the holes of the lugs (1) which are to be welded on a base plate (6). Then, the block is split on a band saw or by a splitting saw on the milling machine. (The width of this cut must be added to the critical dimension at the time the block is machined.) Guides (5) are welded to both sides of block-half (2). When alignment pin (4) is inserted through the lugs and block halves, the latter are aligned and result in a correct spacing. Drifts (7), inserted through the slots of the alignment pin, aid in holding the lugs against the block to free the worker's hands. After welding, the drifts are removed and the alignment pin is pulled out. If considerable distortion has occurred, it may be necessary to remove the drifts and pin by slight hammering. Then, the block halves (2) and (3) are free to slide in the directions of the arrows, resulting in a reduced width that allows for easy removal.

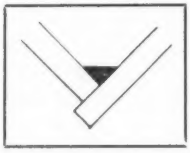


Fig. 11 — Illustration showing "ideal" welding position.

Incidentally, if these lugs are tacked only to be welded later on without a supporting fixture, it is advisable to tack a small brace (8), Fig. 7, across them so that no serious distortion occurs during the subsequent welding. Such a brace is removed after cooling with a sharp blow by a hammer.

Targets are often used in conjunction with locators or rest buttons either to establish the setup of "adjustable-fixed" locators and rest buttons or to determine the position of some part for each weldment. The latter is the case when component workpieces vary too widely (as, for instance, large castings) and locators and rest buttons must be readjusted for every

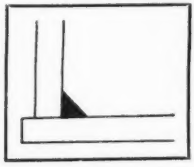
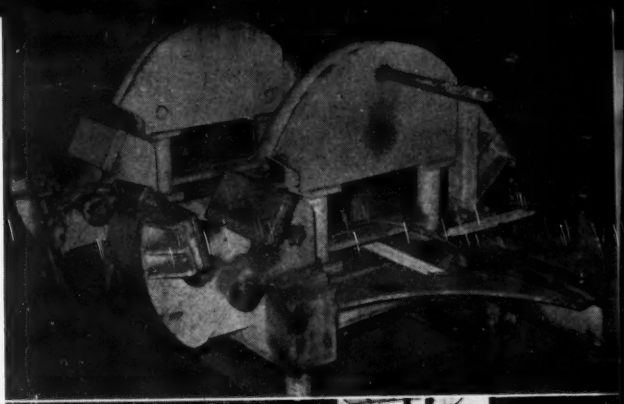


Fig. 12 — Illustration showing "next best" welding position.

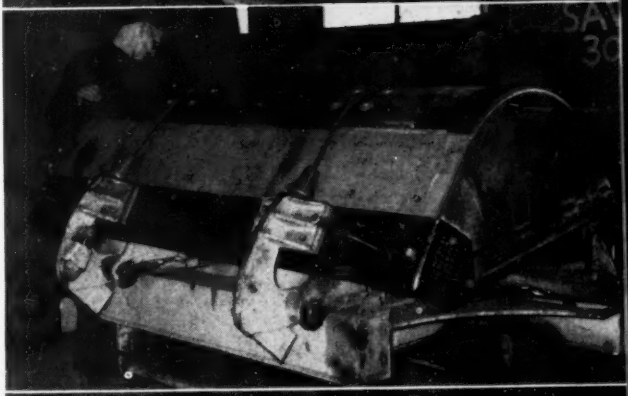
Shop View No. 1 — Shown here is a tacking fixture for a three-quarter yard bucket made of steel plate. The curved sections support the main plate. Front clamps are shown in opened position. The fixture is ready to receive the component bucket parts.



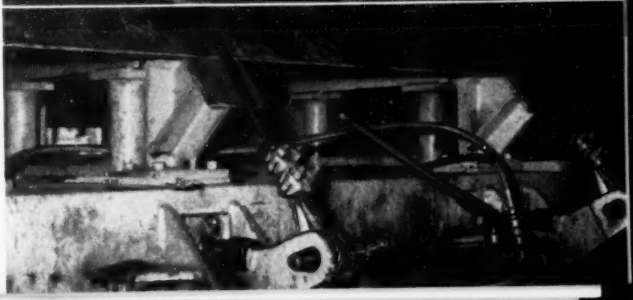
Shop View No. 2—Main plate and cutting edge are dropped onto fixture. Front clamps are still open.



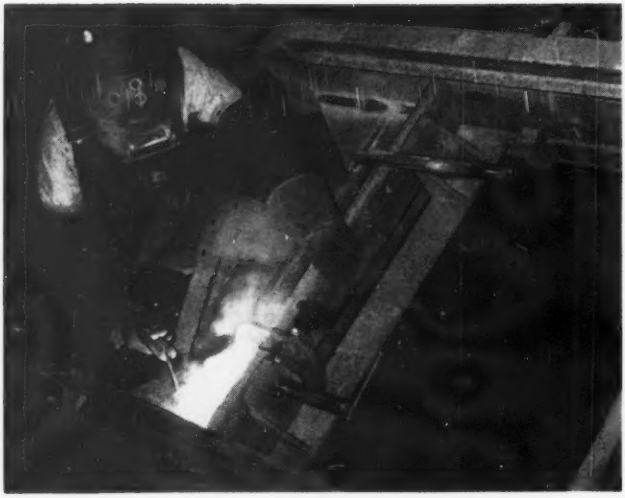
piece. A target usually is shaped to agree with some partial contour of the workpiece and is only used where critical location is required. Targets may be of fixed design (for instance, the part may rest on a target) or it may be hinged and flipped in



Shop View No. 3 — Front clamps are closed as the cables are pulled toward the rear of the fixture. Cable forces main sheet against the curved supports beneath and corrects any possible deviation from correct shape. Operator is dropping end plates onto fixture.



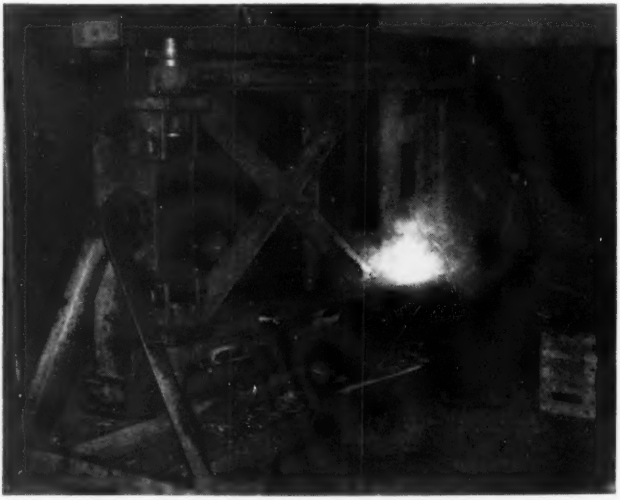
Shop View No. 4—Rear view of fixture shows hydraulic hand pump and two ten-ton hydraulic rams that force cables downward. Note simple cable fastening method, as cables must be removed to permit removal of the tacked bucket.



Shop View No. 5 — Simple trunnion positioning makes a "flat" weld out of a horizontal weld. Flat welds are the easiest type of weld and allow speedy quality production.

and out of location, similar to a flip-type drill plate in a drill jig. As the name implies, targets are usually a visual aid and are not to be confused with removable locators which are used where greater accuracy is desired.

Additional features often found on tacking or welding fixtures are checking pins that indicate oversize component parts and prevent their usage. Figure 8 shows how the flat plates (1) and (2) are located by five fixed locating pins (4) to assure that the upper edges are accurately aligned. However, the curved section of plate (2) is important as it will be drilled after welding to produce hole (5). Also, the curved edge must not be too large or it may cause interference with moving parts at assembly. To inspect part (2) within the fixture, three bushings (3) are provided in the fixture base for



Shop View No. 6 — This large hand driven, balanced trunnion fixture converts an otherwise difficult vertical weld into the next-to-best horizontal weld and at the same time makes the joint more accessible to the operator.



Shop View No. 7—Simple index mechanism for welding fixtures consists of a trunnion stand (structural steel), spring-loaded index pin, pin housing (made of pipe fittings) and index plate. The latter is welded to the end of fixture in such a manner that the loaded fixture is well balanced.

checking pins. These pins may be double-ended (go and no-go) to provide the operator with a simple means to insure accurate results. This feature is especially helpful in cases where 100 per cent inspection of workpieces is lacking.

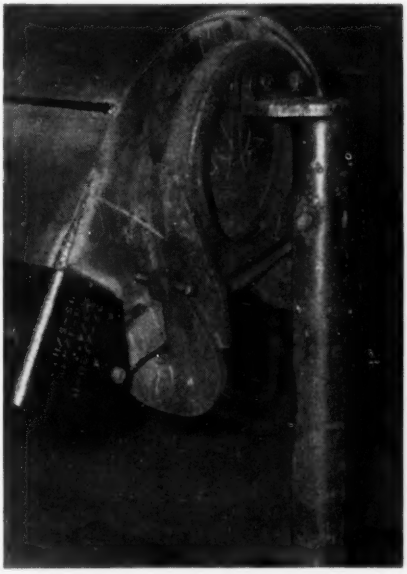
Proper locating and resting are often dependent upon subsequent or previous machining operations. Therefore, the designer must analyze all other tooling for each component part and each subsequent operation before deciding on locating points.

Rest buttons are no different in welding fixtures from those used on machining fixtures and therefore are not discussed here. The only point that must be kept in mind is weld spatter.

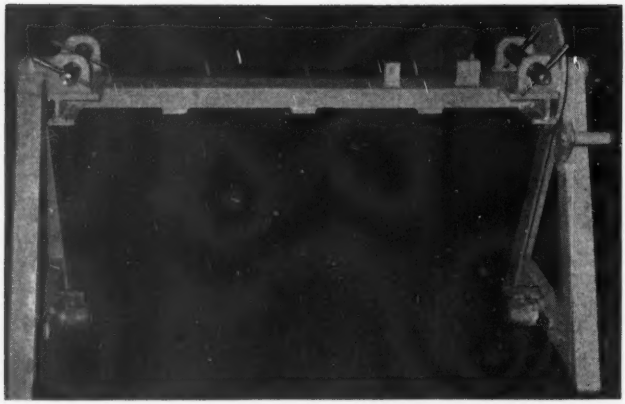
Rest buttons must be well protected if not covered by the workpieces during any welding operation.

Clamps

A variety of clamps may be used for welding fixtures, including strap clamps, cam clamps, toggle clamps, screw clamps, air clamps, hydraulic clamps, and many other clamps, depending upon the application and pressure requirements. Screw clamps, one of the simpler clamps, can exert great pressures but are not to be recommended unless the threads are well protected. Heavy toggle clamps are favorites



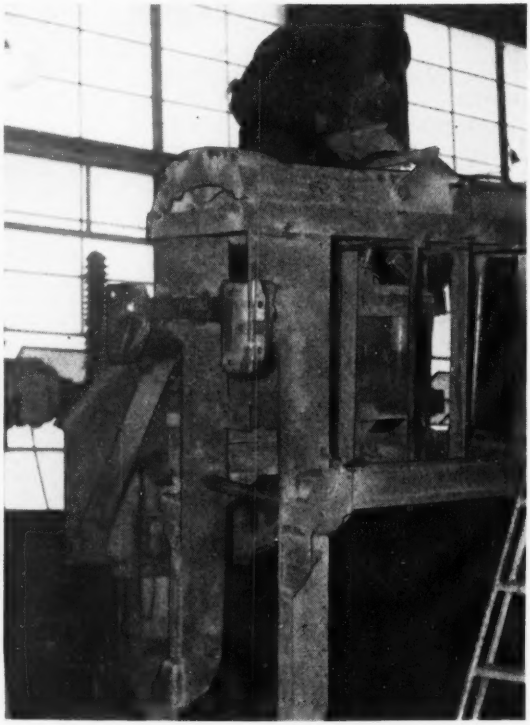
Shop View No. 8—Roller stand with two rollers eliminates necessity of perfect balancing. Circular roller channel with clamps holds the tacked steel bucket for welding inside and out.



Shop View No. 9 — Trunnion stand can be made to fit several different fixtures. Index pin at right front is made for a larger fixture with larger index plate. Fixture shown is indexed with a second index pin at right rear (not shown). Note pipe sockets near floor for a cross brace that may be required to steady heavier and larger fixtures.

with welding fixture designers, and end cam clamps are often well suited. Air clamps, as air cylinders and air brakes, are fast acting but exert only moderate pressures compared to their size, unless they are coupled with linkages, cams, levers, or wedges. Hydraulic clamps, actuated by hydraulic hand pumps or electric pumps are used for high pressures. Air-hydraulic boosters are specified when extremely high pressures and rather short strokes are required.

Occasionally, it is necessary to remove clamps to permit loading of parts and unloading of the weldment. There are several retractable clamps on the market that permit several inches of fast approach and a subsequent locking action that is similar to that



Shop View No. 10—Large power driven positioner is required for operator to reach all welds of this large weldment.

Shop View No. 11—First step in building fabricated welding fixtures is the cutting of component parts of the fixtures. Here is a tool room setup consisting of a small, self-propelled flame cutting machine in the process of cutting a large bevel on a five-inch steel block. Flame cutting is fast and inexpensive and well suited for this purpose.



of an ordinary screw thread. After a quarter-turn of unlocking, the clamp can be retracted instantaneously.

Air brakes or diaphragm-type air cylinders have not been used extensively although they are an excellent means of holding parts together for tacking operations. They provide comparatively high pressures with moderate stroke lengths for their small physical size. They are rather inexpensive and require no oiler or filter as standard air cylinders should have for minimum maintenance. One line of air brakes (about six sizes) ranges from 800 to 3,500 lb.



Shop View No. 12—Tool room welder is putting finishing touches on a welding fixture. Fixtures should be loaded and tested in tool room before released to production.

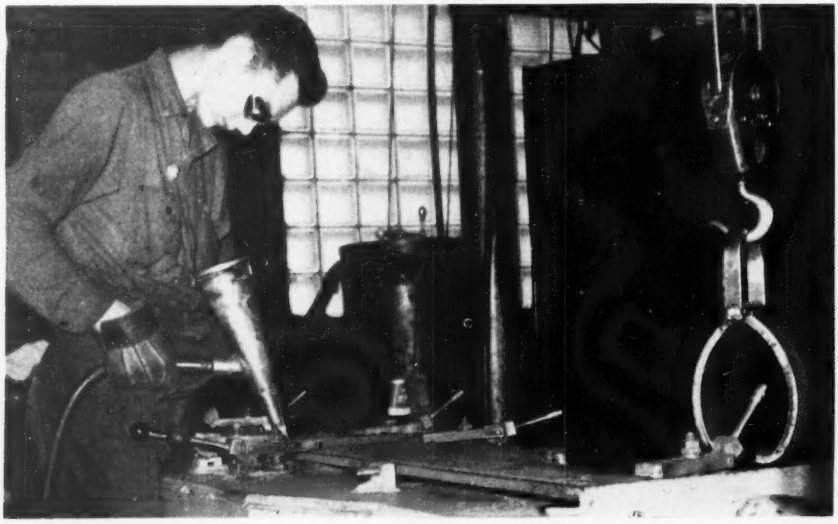


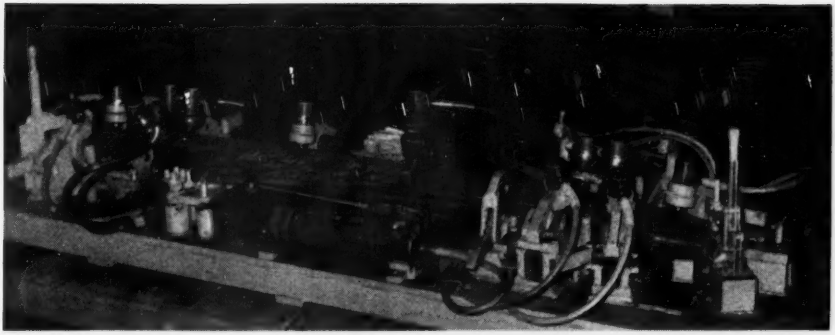
Shop View No. 13—Simple tacking fixture combines drilled plates (right rear) with beveled pipe. Note tacked weldments at left rear.

force (based on 100 p.s.i. air line pressure) and in prices from $22 to $40.

To obtain good results with automatic welding (or manual submerged arc welding), tight joints are a prerequisite. If component parts do not fit too well and if the size of such parts cannot be controlled entirely, tight joints can be achieved in some cases by the use of hydraulic clamping. Figure 9 shows a box section consisting of a base plate (1), a top plate (3), and two side plates (2). The tacking operation must result in tight joints at (4) to permit subsequent submerged arc

Shop View No. 14—An example of manual submerged arc welding of two flat plates end to end. End cam clamps hold the plates in position. Note special lifting hook in right foreground.

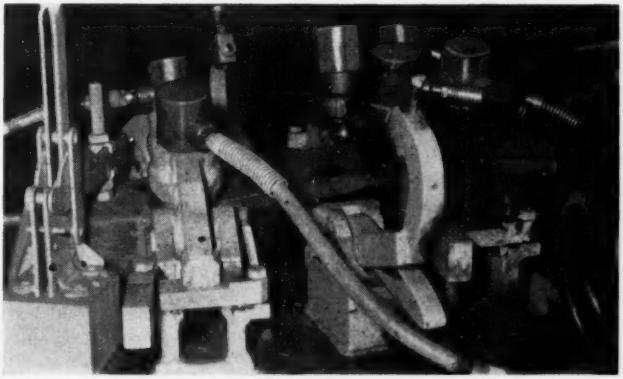




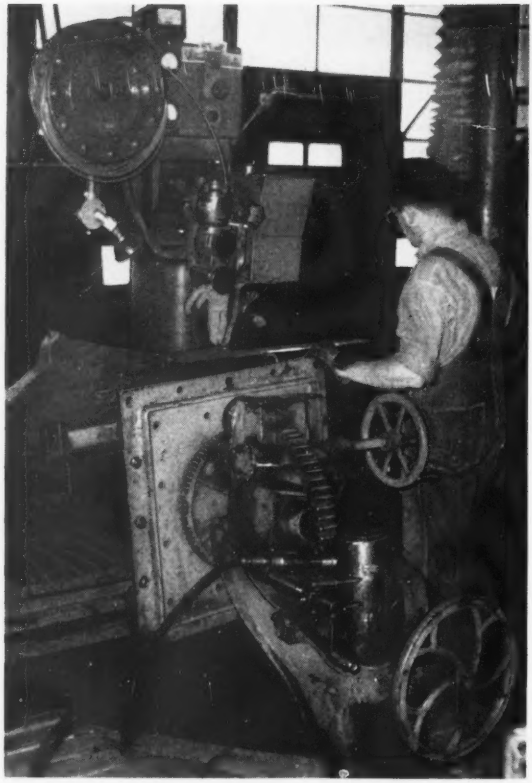
Shop View No. 15—Full view of the fixture described in the text that utilizes thirteen hydraulic rams to assure tight joints for subsequent submerged arc welding. In foreground, center, a three-speed hydraulic hand pump that permits a fast clamping approach and a slower, high-powered final force application. Stacks of completed tacked box sections are in the background.

welding, since it is impractical to use the customary copper backup bar. It has been found entirely practical to utilize hydraulic rams where the arrows are shown to force the bent top plate against the sides and the sides, in turn, against the bottom plate. A hydraulic hand pump of proper size can be used to provide the power. Thirteen rams, seven tons each, are manifolded into a three-speed hydraulic hand pump. The rams are fastened to hinged carriers to permit the loading and unloading of the fixture. Since it is necessary to weld the inside of the box section at some spots (5), the hinged gates were designed to clamp the sides down against the bottom and are then repositioned to clamp the top plate.

Figure 10 shows the two hinged backup bars (1) and (2). When both backup bars are swung outward, ram carrier (3) can be moved back to facilitate loading and unloading. With bar (1) in place, the open box section is clamped, while bar (2) is used when the top plate is tacked to the open box



Shop View No. 16—This is a photographic explanation of drawing Fig. 8, the two-step hinged ram carrier. To extreme left, a large, high pressure toggle clamp holds the round end boss of the box section. Curved toggle clamp in right foreground serves to hold side plate against itself as combination locator and clamp, before the top plate of the box section is placed.



Shop View No. 17—A fully automatic submerged arc welder is used in conjunction with a hand operated positioner to weld the box section shown in previous pictures.

section. The thirteen rams can be positioned and tightened in 80 seconds and loosened in about 50 seconds. In comparison with mechanical clamping, the hydraulic method is roughly four times as fast with the additional advantage of reduced operator fatigue. Hydraulic clamping can also be used well in conjunction with steel cables as shown in the accompanying series of shop view illustrations depicting a tacking fixture for steel buckets.

Positioning

The ideal welding position is the "flat" or "downhand" position, as shown in Fig. 11. Welds made in that position are easier and faster to make, they require less skill, and result in better quality. The next best position is the horizontal position, as shown in Fig. 12, while vertical and overhead welds should be eliminated in production work wherever possible. To convert overhead and vertical welds into the desirable types (flat and horizontal), positioning devices are used. These devices may be built into the fixture or they are provided by special machinery—the hand positioner or the power-driven positioner. A positioning device that is built into the fixture is usually limited to rotation in one plane. If more complex positioning is required, a positioner is normally used in conjunction with the fixture.

A fixture can be designed for positioning simply by the addition of a trunnion stand, an index plate, and an index plunger. The index plate is provided with an index hole for each required position. The plunger should be spring-loaded for safety and for greater speed of positioning. Any trunnion fixture that is not power driven must

Shop View No. 18—Larger weldments can often be produced effectively on a simple hand positioner as shown here. Slotted cross holds part. A hand crank rotates cross with part.



be balanced by the addition of weights or by shifting of the trunnion hinge points to assure safe operation.

Fixtures for Submerged Arc Welding

Holding fixtures for submerged arc welding, such as fully automatic welding or manual submerged arc welding, are essentially the same as for ordinary arc welding with the following exceptions: Normally, there is more heat involved in submerged arc welding and therefore stresses are greater. This fact calls for sturdier fixtures and heavier clamps. The need for tight joints has already been discussed under "Clamps." If tight joints cannot be maintained and the joint is designed so that copper backup bars can be used as backup strips, good welds can usually be readily obtained.

In conclusion, it is only fair to point out that this was not written as an attempt to set a formula for the successful design of welding fixtures, but it was meant to be a guide for those who do not have much experience in this field.



Shop View No. 19—A shoulder crew with cross handle locates sub-weldment in fixture. For easy removal of welded assembly, locator must be backed up, away from the shoulder. Note special lift clamp in background.

It Pays to Pay Attention to Fundamentals . . . By C. W. KENNEDY

The author discusses common errors in the use of gaging instruments and how they can be eliminated to reduce scrap, rework, and rejections.

USUALLY, the football team that wins consistently comes out ahead each game because its players have taken a rigorous drilling in the fundamentals. The team may have an outstanding star or two or a portfolio of trick plays but, when you search for the real reason for its steady success, you find the players know how to block, tackle, pass, and punt and how to handle the ball without fumbling. Similarly, in the few shops putting out the highest grade product with the lowest scrap record, the workers know not only the fundamentals of correct machining but also of measurement.

It is surprising the number of times scrap, rework, and rejections run high, and particularly how assembly costs mount up, because of the failure of the operator to measure his work correctly. There are certain essential fundamentals in connection with measuring correctly just as there are in football. Many workers are admittedly hasty and careless in the way they check a piece of work, but just as many more very evidently never learned the fundamentals of correct measurement. What a shame it is to build up unnecessary expense and manufacturing loss because people fail to use instruments correctly, especially since the regulations are simple, obvious, and logical.

Any mechanic should have a fundamental working knowledge of the following elements of measurement: reference point; gaging pressure; cramping; parallax; flinching; discrimination; temperature; and repetition.

A linear measurement should be broken down into two points—the reference point and the measured point. Measurement should be taken always **from** the reference point **to** the measured point. If this principle is consistently followed, the worker has taken a long step toward measuring correctly. The law holds whether it is reading 64ths of an inch on a steel rule or measuring millionths of an inch on electronic equipment. The closer the measurement and the more sensitive the instrument, the more necessary it becomes to observe this reference point principle.

It can be simply illustrated by the ordinary steel rule. If the rule is used properly and professionally, the 1-inch graduation is indexed against one edge



Fig. 1—This illustration depicts the reference point principle of measurement in which an ordinary steel rule is used to measure the diameter of a hole. The 1-inch mark on the rule is the reference point which is used as a pivot or hinge so that the rule can be swung back and forth slightly along the arc of the hole until the opposite point on the longest chord, which is the true diameter of the hole, registers as the highest reading on the rule's graduations.

of the piece being measured, as illustrated in Fig. 1, the 1-inch mark becoming the reference point. Using it as a pivot or hinge, the rule is swung back and forth slightly along the arc or the hole (see Fig. 1) until the opposite point on the longest chord, which is the true diameter of the hole, registers as the highest reading on the rule's graduations. The latter becomes the measured point, and the use of the rule in the manner shown in Fig. 1 indicates also the measured point. To read the rule, the eye should travel literally from the reference mark to the measured point graduation.

A suitable reference point or reference surface is designed into practically every commercial gage or measuring instrument. They are referred to as fixed jaws or anvils, as the base or platen. A surface plate is essentially a general reference surface. The trick in using any gage is first to get the reference anvil properly and firmly located on the workpiece or establish the workpiece on the reference surface. Such a knack saves many a headache in registering accurate measurements.

In the use of the commonplace micrometer, most of us would measure more competently with it were we a little more deliberately conscious of holding its fixed anvil against the workpiece and then turning the thimble, rather than leaning all our weight on the erratically twisting spindle. If we thought of resting one side of a fixed snap or plug gage on the work and in a manner wheeling the gage in on the work, we would obtain more accurate results than from the usual technique of purely jamming the gage at the work.

Figure 2 illustrates how the proper use of the reference anvil and the sensitive contact (measured point) principle has been made practically automatic for the user. The instrument reading cannot be affected by the weight of the gage or the user's hand because they are fully supported by the solid upper anvil. The gage naturally pivots and swings onto the workpiece until the backstop ends its motion. Then and then only, the measuring contact transmits the correct measurement to the indicator, a process wherein the measurement is truly taken from a reference point to a measured point.

Proof of the fact that the reference principle in measurement has failed to reach home can be found in the ordin-



Fig. 2—This illustration shows how the proper use of the reference anvil and the sensitive contact (measured point) principle has been made practically automatic for the user. The instrument reading cannot be affected by the weight of the gage or the user's hand since they are fully supported by the solid upper anvil.

ary condition of factory surface plates. Too many of them are rusted, nicked, and dirt crusted. And look at the underside of height gage shoes for the scratches and burrs raised up by setting them down carelessly on gritty bench surfaces. You will often see a man use an electric comparator whose indicator will readily register half tenth size differences but whose platen or reference anvil may be well worn, corroded, or gouged, or sometimes even loose on the gage casting.

The apparent sizes of a piece can often be altered almost at will by the amount of pressure applied to the gage. A hole that is actually undersize, for example, can be brought to look like correct size by a little judicious forcing of vernier caliper jaws into the hole. Most muscular machine operators can spring a snap gage enough to accept a piece a couple of thousandths oversize without apparent effort, and many a threaded piece has been beautifully sized to specification by twirling a ring thread gage over it.

While there are no official figures, there seems to be a general agreement among gage designers that gaging pressure should seldom exceed two pounds and, for fixed gages, probably should seldom be less than a half pound. Certain instruments, as in the case of some indicating gages, exert only a few grams or a few ounces of pressure. In terms of a man using a plug gage, for instance, the ordinary range of acceptable gaging pressure can be thought of in terms of pencil pressure. In other words, if the operator or inspector applies the gage to the work with about as much pressure as he uses writing his name on a piece of paper, he is pretty close to correct gaging.

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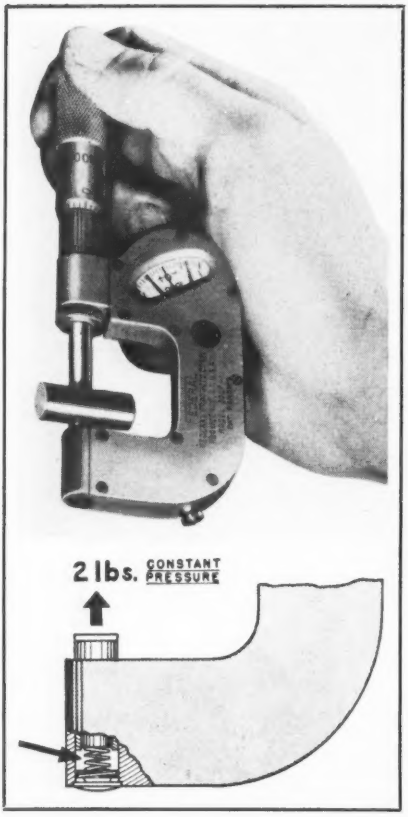


Fig. 3—The indicating micrometer takes the matter of gaging pressure control "into its own hands" by utilizing a spring-loaded constant-pressure lower anvil as illustrated herewith.

the matter of gaging pressure every time it is used, principally because the pressure exerted by the fingers on the thimble is compounded at the anvil, clamping the workpiece by the natural leverage available in the mike's screw thread. We use the screw jack principle when we want to lift our car off a flat tire or move a house, but the famous leverage ratio of a screw often produces some "screwy" results in measurement when it goes to work inadvertently in a micrometer. While many micrometers are equipped with spring ratchet devices, the indicating micrometer takes the matter of gaging pressure control into its own hands by utilizing a spring-loaded constant-pressure lower anvil, as illustrated in Fig. 3. In general, the advent of indicating gages in a shop gets rid of one source of measurement error—the important matter of gaging pressure—because some form of pressure control is designed directly into them.

Again, perhaps as many outside pieces get by machine operators and inspectors because little or no regard is paid to the geometry of the particular measurement. The familiar positioning and rocking of capliers in a hole, a technique like that diagrammed in Fig. 4, indicates quickly that a measuring instrument must be located on the proper axis of the work in order to give the correct reading. In Fig. 4, the calipers are incorrectly positioned in sketches **A**, **B**, **D**, and **E**. Sketches **C** and **F** show them in proper relation.

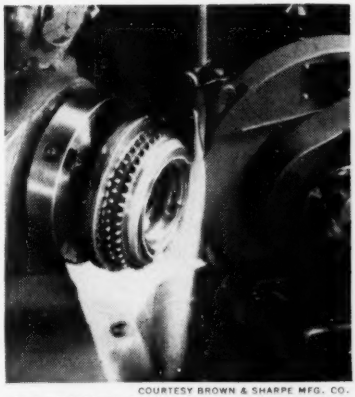
It is easy, for instance, to cramp or tilt a rectangular bar enough in mike jaws so that the mike barrel reading can be a few tenths if not a thousandth larger than the actual thickness of the flat piece. Similarly, an undersize piece can be readily kept from slipping through the no-go jaws of a fixed snap gage by tilting it a trifle. The tendency to cramp an instrument, to measure a diagonal is strong; thus, rejects creep into the good work and valid pieces are often unfairly discarded. Operators and inspectors get a quick lesson in the errors of cramping the minute they try indicating gages by simply tilting a workpiece in the gage anvils

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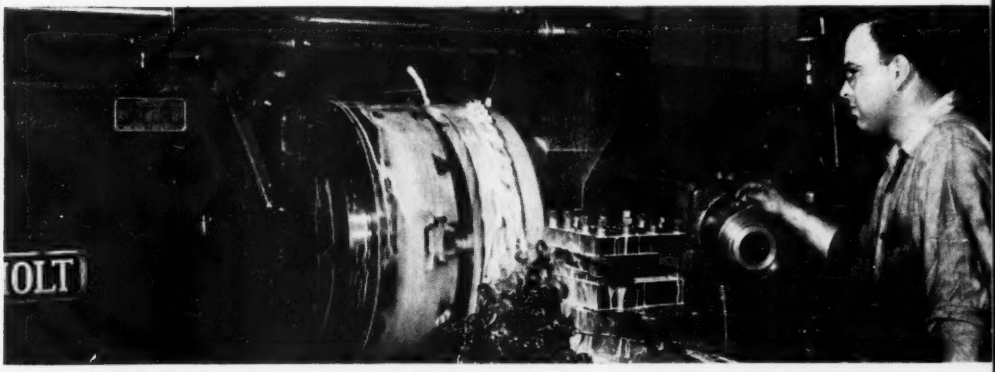
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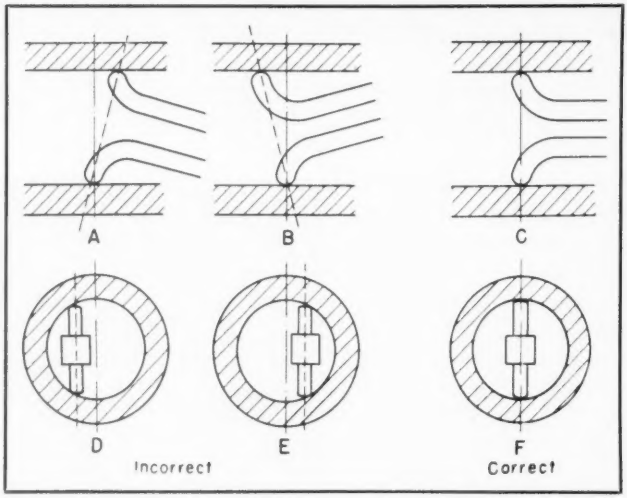


Fig. 4 — The familiar positioning and rocking of calipers in a hole, a technique like that shown herewith, indicates quickly that a measuring instrument must be located on the proper axis of the work in order to give the correct reading. The calipers are incorrectly positioned in sketches *A*, *B*, *D*, and *E*. Sketches *C* and *F* show them in proper relation.

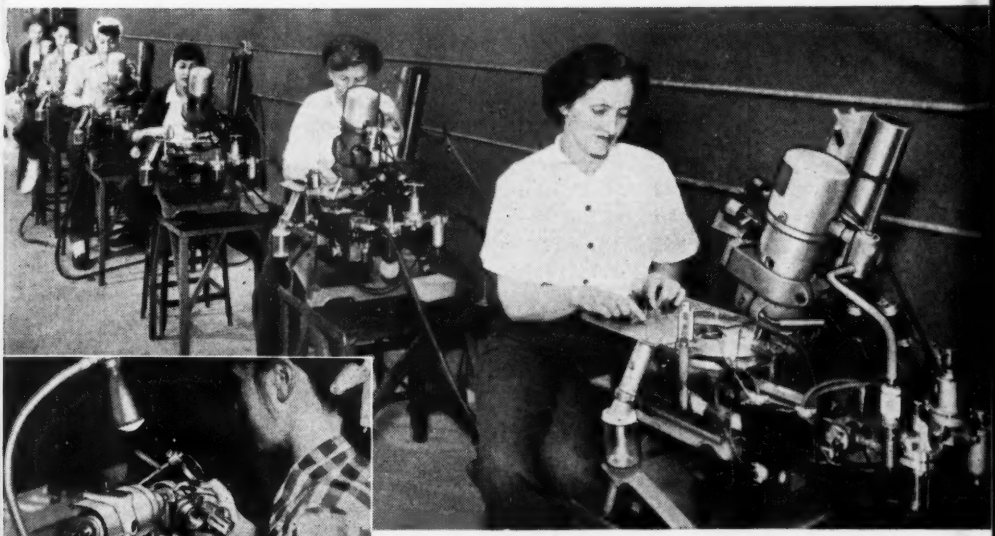
or cramping the gage to one side. The immediate swing of the indicator hand discloses the amount of geometrical error. Furthermore, the correct gaging position can be determined by observing where the indicator hand swings to a high or low position on the dial and starts receding.

Parallax is an unwieldy word to use around the shop. Yet, the condition it describes produces some unexpected errors in measurement. By definition, parallax is the apparent shifting of an object due to a change in position of the viewer. The mantle clock supplies a good example. Look squarely onto it, say at twelve o'clock. Then move a few feet to the left. The time you actually see from that angle is three or four minutes after twelve. The point to be brought out is that, in measuring, one should get his nose and eyes squarely over the graduation to be read rather than slip into the slack habit of glancing sideways at a scale and taking what is then seen as gospel.

While the parallax error will not occur often enough ordinarily to be serious, describing it to shop people does have the salutary effect of making them more conscious of measurement errors in general and usually helps to eliminate other careless habits with instruments.

Another fairly common type of measuring error goes under the term of flinching. Unconsciously cramping a gage on a workpiece to make the reading match the tolerance is one form of it. The story is told of the worker who kept on miking a piece until he had burnished it down to where it actually was the right size. You get another example of it, looking back at Fig. 1, in the use of the steel rule. After you have indexed the rule at the reference point and as your eyes travel over to read the hole diameter at the measured point, there is a subconscious tendency, hard to control unless you realize it, for the fingers to pull the steel rule along in the direction the eyes are moving. If a vernier reading is right on the borderline—

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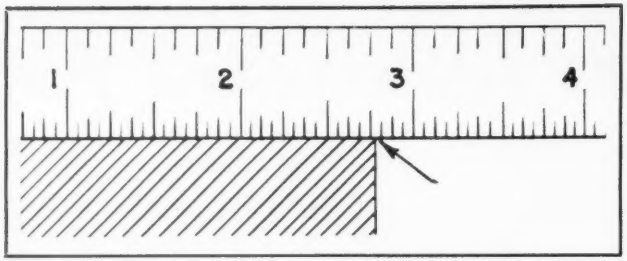


Fig. 5 — This sketch shows a quick and easy method for measuring a piece of bar stock with a steel rule by using the 1/32nd scale.

where there might be a choice, for example, between calling the reading 0.875 inch or 0.876 inch—the decision will almost automatically be in favor of the 0.875 inch reading if that is the required specification. A man will also unwittingly modify gaging pressure in order to "bring" a piece to exact size.

On the whole, flinching infrequently causes trouble. Its worst feature perhaps is its slight similarity to the narcotic habit. From just a little unintentional flinching, a worker can develop definite carelessness. Flinching a half thousandth may not mean much, but soon an error of a full thousandth is readily overlooked. Where work is constantly rejected by a receiving inspector as being just a little off size, flinching would be one of the symptoms to look for.

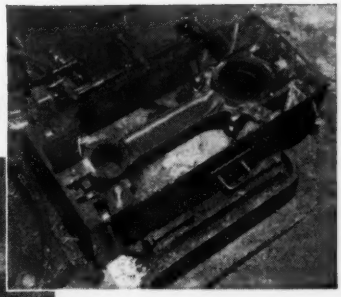
Next—temperature and its effect on measurement errors. The handbook will tell you one inch of steel expands some six millionths of an inch with each degree of temperature rise, and most every shop man knows it. But when it comes to handling measuring instruments, the expansion of metal becomes forgotten or ignored. For one thing probably, few of us realize how fast metal absorbs heat from the hands and how long it takes to cool off.

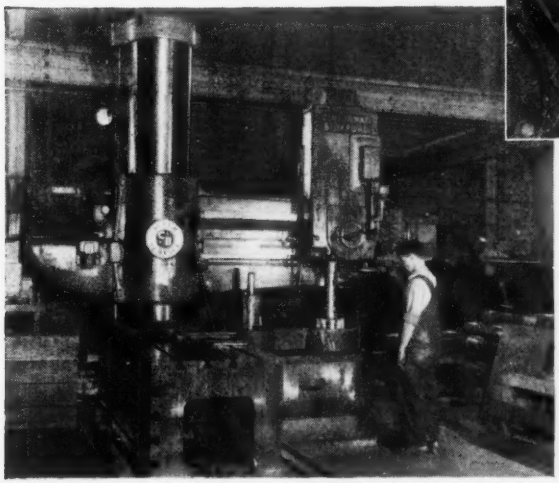
Suppose you are using vernier calipers to measure a ten-inch hole, for example. You hold the caliper in two hands by its beam or bar, both to adjust the sliding jaw for the measurement and to read the vernier. All in all, you are holding it more or less tightly for several minutes perhaps. In that period, the temperature of the caliper has probably gone up at least ten degrees. Until you have once witnessed actual heat absorption tests, you are surprised at the temperature rise that does occur, seemingly in no time at all, in portable instruments from average handling. In the case of the vernier calipers, you have ten inches of beam length affected by a ten-degree rise. By simple arithmetic, (10 inches x 10 degrees x 0.000006 = 0.0006 inch), the caliper jaws have been pushed certainly a half thousandths further apart. The other surprise is that, while the heat goes in quickly, it drains off slowly. It would take probably at least twenty minutes for your vernier caliper to get back to room temperature after you dropped it on the bench.

For ordinary tolerances on small pieces, the temperature effect in instrument errors is ordinarily indiscernible, but where the work has extra length or breadth requiring larger capacity gages, temperature needs to be considered. It is a safe rule either to mount the gages, rack them up in some manner so they don't need to be held in the hands, or specifically coach

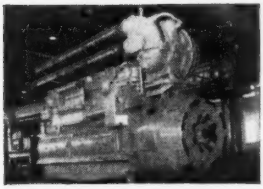
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the workers to keep their hands off measuring instruments as much as possible.

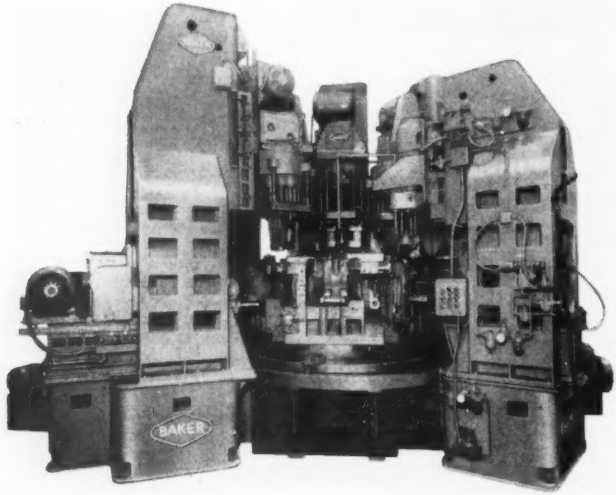
Shop people get a temperature rise themselves from one common shop wrangle where the temperature of the workpiece is the innocent cause of the trouble. An operator will measure pieces as they come hot from the machine and okay them. Several hours later, an inspector rejects them as undersize. The answer is obvious; the pieces meantime have cooled off and shrunk noticeably in dimension. The moral is that discrepancies in size and disputes over them can frequently be traced to unnoticed temperature conditions.

Close to last but not least, there is the matter of what some choose to call discrimination, a matter which, again, can be described with a steel rule. Suppose a piece of bar stock is being measured, as illustrated in Fig. 5, and the edge of the bar comes between the $\frac{3}{4}$-inch and $\frac{13}{16}$-inch marks. What size is it? Perhaps the mechanic would estimate 25/32 inch. On the other hand, why not turn the rule over and use the 32nd scale or even the 64th scale and read directly and accurately the correct width?

Oversize or undersize, rework and scrap and all the expense caused by the manufacture of outsize work can often be rapidly cut down by putting gages of the proper discrimination on the job. If the tolerance is in 64ths, a steel rule will do. If the print calls for nothing closer than a thousandth, ver-

Multi-Operation Machine for Clutch Housings

MANUFACTURED by Baker Brothers, Inc., Toledo, Ohio, for a leading automobile company, this multi-operation machine, utilizing standard Baker 7½ x 16 and 15 x 16 units and a 72 inch six-station power indexing table, performs drilling, chamfering, boring, counterboring, and tapping operations on clutch housings at the rate of 80 parts per hour at 100 per cent efficiency. Units of the machine are mounted in horizontal, vertical, and angular planes for performing operations at six stations.



CK MILLING MACHINE SPEEDS OUTPUT OF STANDARD PRODUCTION PARTS



THE FACTS ON THIS JOB ARE: Machine: No. 6 — Model CK Plain (25hp) with heavy-duty universal Milling Attachment. Part: Large fusilage spar fitting — overall dimensions 39-5/16" x 17-3/8". Material: Aluminum Alloy 75ST (forging). Tool: 2-inch, 2-lip end-mill. (HSS). Speed: 265 rpm. Feed: 3-1/8 ipm.

TEN ALUMINUM ALLOY 75 ST (FORGING) AIRCRAFT SPARS PRODUCED EVERY HOUR
CK MILLING MACHINE FEATURES THAT HELP DO THIS JOB BETTER

- This CK milling machine has 24 different spindle speeds (13 to 1300 rpm), with 32 different table feeds (3/8 to 90 ipm). Operator was able to pick proper speed and feed, benefit from high horsepower modern tools.
- Greater rigidity of new CK column easily absorbs vibration from heaviest cutting loads. Only single pass needed for each part.
- CK's 3-bearing spindle and flywheel assures Maximum Cutter Efficiency. On this job, it meant fast metal removal and excellent finish in a single pass.
- CK's new heavy duty (2" dia.) table feed screw gives greater bearing contact for smoother feed performance and sustained accuracy.
- New CK machines have greater horsepower. On this job, 25 hp permitted operator to get maximum production from this modern cutter.

HERE'S a typical example of how relatively inexpensive tooling greatly increases the versatility of Kearney & Trecker's new CK milling machines . . . producing a completed part every 6 minutes. Two operations were required for each part — (one) milling out the holes and recessing on the edges, then after changing the attachment setting and cutter — (two) finishing the inside (see photo). For the full story, contact your nearest Kearney & Trecker representative or write: Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.

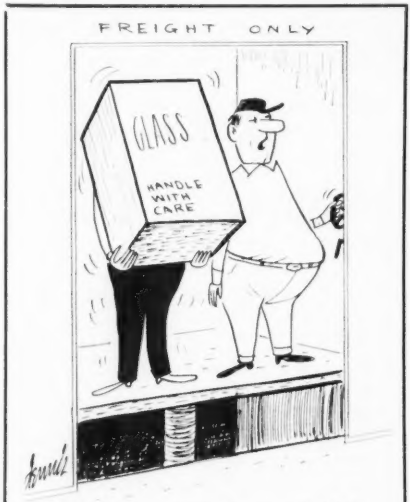
KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

nier equipment should have enough discrimination. But if the work is to be more precise, vernier micrometers or, better, indicating equipment is needed. Flush pin gages cannot be depended on for tolerances under 0.002 inch and, the way they are ordinarily used, fixed snap and plug gages should not be trusted to detect size differences in the neighborhood of 0.0005 inch and less. For extra precise work, micrometers and mechanical indicators begin to falter and air and electronic equipment becomes the order of the day.

Trying to estimate size with inadequate gaging equipment is like whistling in the dark, and whistling in the dark is for small boys passing cemeteries at night. One advantage dial indicating equipment offers is a wide range of magnifications plus a choice of dials graduated so thousandths, half and quarter thousandths, tenths and half tenths can be read directly. Let the machinist cease guessing by feel and visual estimating. Let him see size directly and positively with intelligently selected gages having the necessary discrimination, and costly offsize work is bound to dwindle.

The acid test of most measuring equipment and of the way a man measures is repetition. If the worker can get the same measurement twice, a third and fourth time if need be, the chances are he is using suitable gaging equipment and manipulating it properly. Once the worker fixes the idea of repetition in his mind, he begins to look for reasons for failure to get repetition. He may then discover his technique is poor—that he has perhaps lapsed into some of the errors previously described. He may seek more accurate measuring devices, gages with finer discrimination. Because he fails to get repeat readings, he may uncover an unsatisfactory taper or out-of-round condition in the work. And the test for repetition almost always discloses worn, loose, inaccurate measuring equipment which should be taken off the job.

If your shop is troubled with scrap, rework, salvage, and offsize parts, you could do worse than concentrate on measuring errors for a while as a means for reducing losses and improving your product. The older men know the sort of shortcomings described above but they may need a review and refreshening on the subject. Many of the new and younger operators probably never heard or thought of these lapses in measuring skill. Perhaps something in the nature of instruction "classes" and demonstrations in measuring fundamentals would help. Maybe just passing this article around for machine operators to browse through would do the trick.



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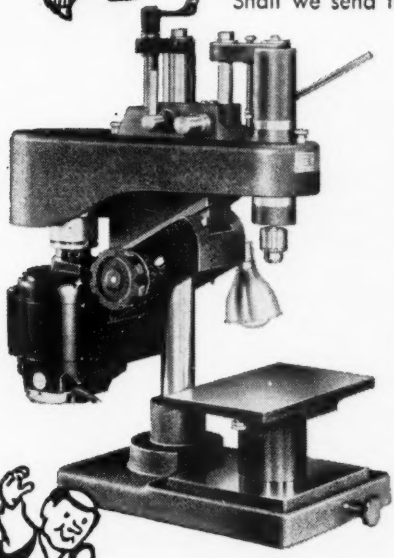




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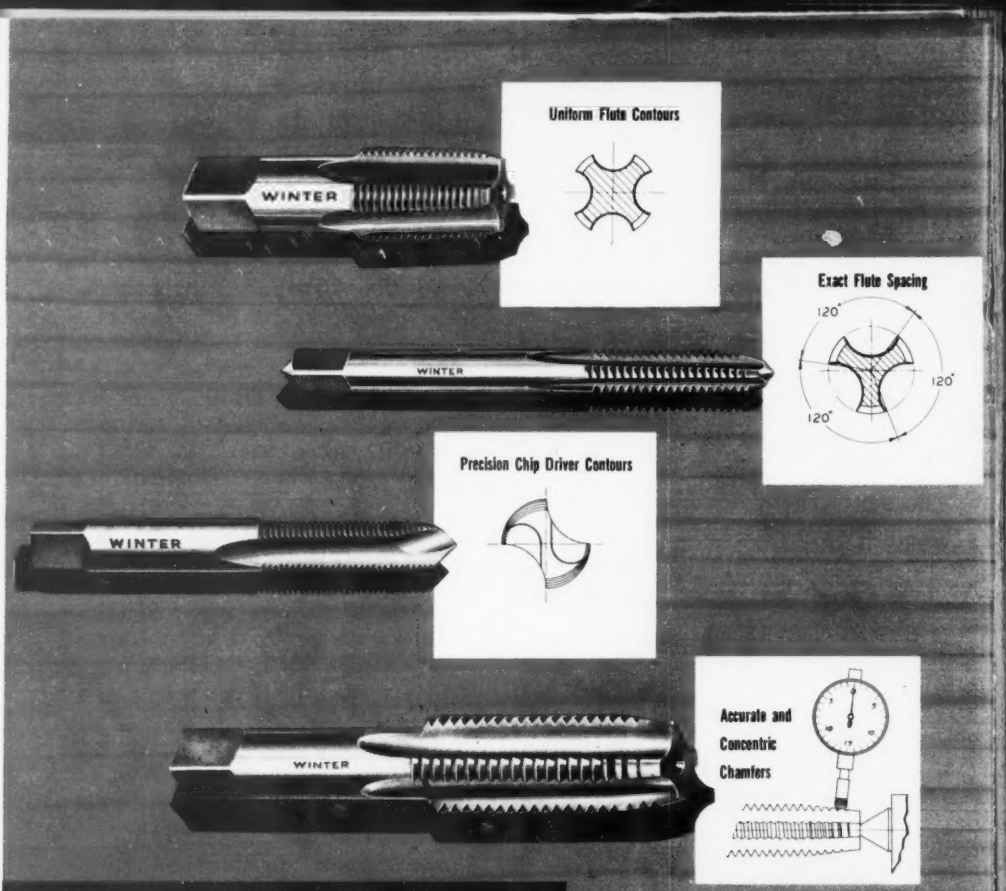






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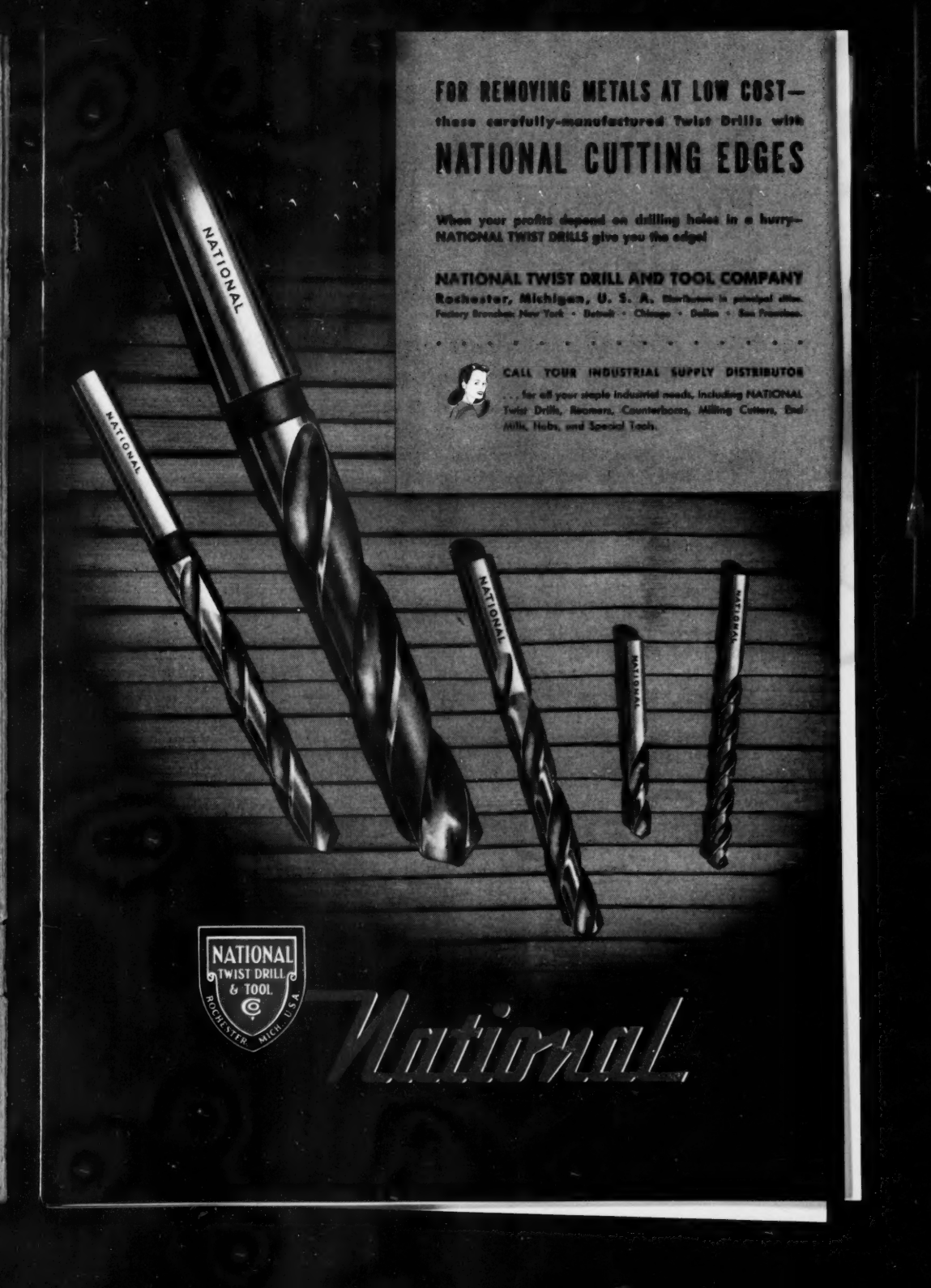


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Nitriding as a Production Tool, Part I

By LESTER F. SPENCER
Chief Metallurgist, Landers Frary & Clark

First of a two part article in which the author describes the nitriding process and the materials on which it may be used.

NITRIDING can be considered as a specialty case hardening process whereby remarkable high surface hardness is imparted without the need for subsequent quenching as experienced in standard heat treat procedures. This process consists of subjecting a machined and heat-treated part to the action of a nitrogenaceous medium which is usually ammonia gas.

The characteristic properties of the nitriding method of heat treatment has established its use in specific applications; these properties being enumerated as: (A) Due to the low temperature experienced in nitriding, which is usually from 950 to 1100 degrees Fahr., there will be no appreciable warpage or distortion within the finished part; (B) Since high surface hardness can be realized without subsequent quenching, no undesirable surface changes will take place; (C) A properly nitrided surface has exceptional retention of surface hardness at elevated temperature. Thus, hardness values remain constant even at temperatures up to 1,000 degrees Fahr.; (D) Nitrided surfaces exhibit remarkable wear resistant properties; this being particularly effective on applications involving sharp abrasive action such as is encountered in sand nozzles. It is also highly resistant to atmosphere, water and salt water corrosion; and (E) Nitrided steels have less tendency to seize or gall.

As mentioned previously, nitriding has several disadvantages which limit its usage. Thus, the cost of this operation, as compared to other surface hardening methods, is greater; this being due to (a) the necessity of having a heat treatment to condition the work for heat treatment; (b) the necessity of having a long nitriding cycle so as to obtain an effective case depth; and, (c) the care that must be practiced before and during nitriding so as to obtain satisfactory service life.

In the latter point mentioned, the necessary precautions would include the following: (A) The establishment of a proper operational sequence so as to completely eliminate residual stresses or strains prior to nitriding; (B) To establish a heat treat cycle prior to actual nitriding so that the initial structure, identified as 'sorbitic' is realized; (C) To obtain experimental

data on each type material and design so that the growth that is experienced upon nitriding can be determined. Thus, the items to be nitrided can be undersize, the value of which would be equal to the growth of experienced, with the net result that the nitrided articles are in accordance to the required blueprint dimensional specifications; and (D) To establish procedures of technique involving such factors as (a) economical method for loading parts within the furnace for nitriding; (b) establishment of the proper cycle not only to obtain the desired case characteristics, but also to realize economical use of ammonia; and, (c) to establish a proper heating and cooling cycle so as to obtain the required case characteristics.

Although true nitriding, which is the principal theme of this article, is practiced quite extensively, it is well to mention those processes which are often identified as nitriding procedures. One of the more recent perfected procedure is the use of the salt bath; this method being used to a considerable extent in the final casing of tools in the finished ground condition made from high speed steels. In this method, case depths from 0.001 to 0.002 inch is obtained with an immersion time varying from 30 to 90 minutes. Due to the thinness of case, a re-casing is required whenever the tools are reground. The salt bath is usually operated around 1000 to 1050 degrees Fahr.; the hardness of case being approximately 1100 Vickers. This high hardness is responsible for the resultant increase in tool life realized. Due to the low operating temperature of the salt, the resultant case is composed largely of nitrides.

Carbo-nitriding, which is synono-

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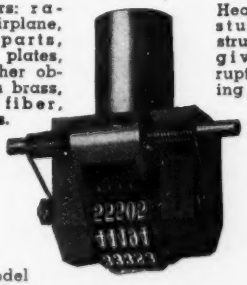
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Table I—Materials that are commonly Nitrided

TYPE	CHEMICAL COMPOSITION PER CENT						
	Carbon	Manganese	Silicon	Chromium	Aluminum	Molybdenum	Nickel	Other Elements
Nitralloy 135 (Type G)	.30/.40	.40/.60	.20/.40	.90/1.4	.85/1.2	.15/.35	——	——
Nitralloy 135 Modified	.38/.45	.40/.70	.20/.40	1.4/1.8	.85/1.2	.30/.45	——	——
Nitralloy N	.20/.27	.40/.70	.20/.40	1.0/1.3	.85/1.2	.20/.30	3.25/3.75	——
Nitralloy EZ	.30/.40	.50/1.1	.20/.40	1.0/1.5	.85/1.5	.15/.25	——	Se — .15/.25
Nitralloy GH	T.C./ 1.25/1.5	.40/.60	1.25/1.5	.20/.40	1.0/1.5	.20/.30	——	——
Nitralloy H***	.20/.30	.70 Max.	.40 Max.	1.0/1.5	.75/1.5	.15/.35	——	——
Nitralloy Alamo***	.25/.35	.70 Max.	.40 Max.	——	1.0/1.4	.60/1.0	——	——
Nitralloy Cast Steel*	.15/.20	.50	.40	2.5/3.0	——	.40/.55	——	V — .20/.25
Nitriding Cast Iron**	T.C./2.93 G.C./2.31	.76	2.69	1.28	1.01	.24	——	V — 0.16
S.A.E. 4130	.28/.33	.40/.60	.20/.35	.80/1.1	——	.15/.25	——	——
S.A.E. 4140	.38/.43	.75/1.0	.20/.35	.80/1.1	——	.15/.25	——	——
S.A.E. 4340	.38/.43	.60/.80	.20/.35	.70/.90	——	.20/.30	1.65/2.00	——
A.I.S.I. 8630	.28/.33	.70/.90	.20/.35	.40/.65	——	.15/.25	.40/.70	——
A.I.S.I. 8640	.38/.43	.75/1.0	.20/.35	.40/.60	——	.15/.25	.40/.70	——
A.I.S.I. 9440	.38/.43	.90/1.2	.20/.35	.30/.50	——	.08/.15	.30/.60	——

*As reported in Cast Metals Handbook, 3rd Edition; **As reported by Colwell, Iron Age, Dec. 19, 1935; ***Allegheny Ludlum Steel Corp.
Note: T.C.—Total Carbon; G.C.—Graphitic Carbon.

mous with ni-carbing, dry cyaniding and gas cyaniding, is a relatively low-cost case hardening procedure where a simultaneous absorption of both carbon and nitrogen takes place. Although this process cannot be considered as a true nitriding operation, an increase of case hardness is realized due to the absorption of nitrogen. The operating temperature usually ranges from 1200 to 1650 degrees Fahr. with the atmosphere for carbo-nitriding being composed of a mixture of hydrocarbon gas and ammonia. Both of the above mentioned factors will vary with individual practices. The case depth, which will normally vary from 0.003 to 0.015 inch, is a factor of both time and temperature of carbo-nitriding. In many instances, a quench is usually required to realize the full hardness, usually up to C65 Rockwell, however, in some instances, an air quench may suffice where the case is largely composed of nitrides. The principle usage of this process is the case hardening of small parts.

Nitriding Compositions

In considering a true nitriding operation, one condition for material is that it contain those alloying elements which respond to the formation of nitrides. This is especially true in the case of nitriding in order to realize those characteristics which have been previously stated. As can be seen in the analysis as given in Table I, the alloying elements listed, with the exception of nickel, form stable nitrides; the efficiency in forming these nitrides varying with the specific alloy. Thus, both chromium and aluminum are strong nitride formers far over-shadowing those other alloying elements as

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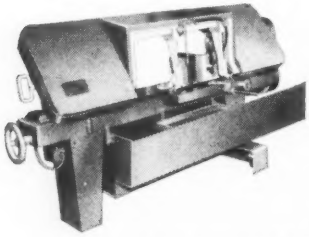
molybdenum, vanadium, manganese and tungsten.

The initial compositions that were offered for nitriding are the "Nitralloy' steels. Within this group, Nitralloy 135 is considered as a general purpose alloy type which is adaptable for a wide variety of applications where good physical and average machining properties are desired. Both Nitralloy 135 modified and Nitralloy N are used where superior physical properties are desired; the former mentioned alloy being used quite widely by the aircraft industry. The latter mentioned alloy, Nitralloy N, contains appreciable amounts of nickel; this alloy will strengthen and toughen the case with a moderate decrease in case hardness. In addition, it has a similar effect on the core which provides better support for the hard, wear resistant case. It develops dispersion hardening in steels containing appreciable proportions of aluminum by which articles may automatically acquire higher core strength and elastic properties. A precaution that should be observed in the use of Nitralloy N is that in tempering prior to actual nitriding, the value should not be below 1100 degrees Fahr., otherwise precipitation hardening will take place resulting in difficulty in machining. Precipitation hardening effect should take place only in the nitriding operation.



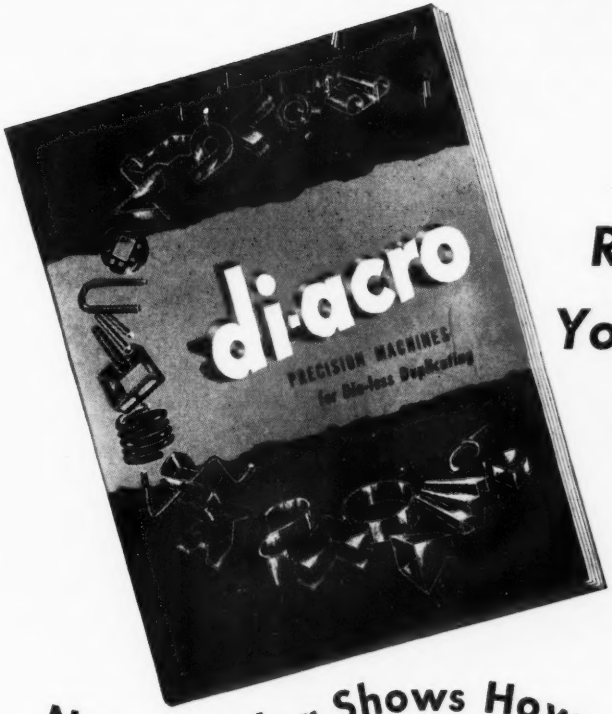
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Nitriding can also be extended to the casting fields; however, as stated previously, nitride forming elements must be present. Thus, the analysis as given in Table I has chromium and molybdenum as alloying agents, aluminum being completely eliminated since this element contributes to casting difficulties. Nitriding of cast irons have realized hardness values on the surface varying from 800 to 900 Vickers diamond Brinell, 10 kg. load. As in cast steel, aluminum will contribute to casting difficulties; however, it seems that it is an indispensible element in nitriding cast irons. Thus, as indicated, aluminum along with chromium and molybdenum are the nitride forming

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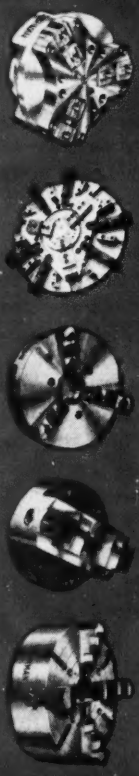
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elements. There are also a number of standard steel compositions which can be nitrided; as indicated, these compositions being of the chromium-molybdenum or the chromium-nickel-molybdenum types. Although the nitrided case has a hardness considerably below that exhibited by the nitralloy series, nevertheless, these steels have improved resistance to wear, increased endurance limit and non-seizing properties superior to the identical compositions not nitrided, but heat treated in the conventional manner.

The Nitriding Process

The three conditions which should be met prior to nitriding component parts can be listed as (a) the parts should be free from all internal stresses resulting from both machining and the heat treatment phases; (b) the parts to be nitrided should have the characteristic 'sorbitic' structure; and, (c) the parts should be free from decarburization. Freedom from internal stresses is required in order to realize a relative freedom from objectionable warpage or distortion. In regard to the recommended 'sorbitic' structure, which is obtained by means of a normal heat and quench procedure followed by a sufficiently high tempering temperature, this factor will assure a uniform growth. This growth can be pre-deter-

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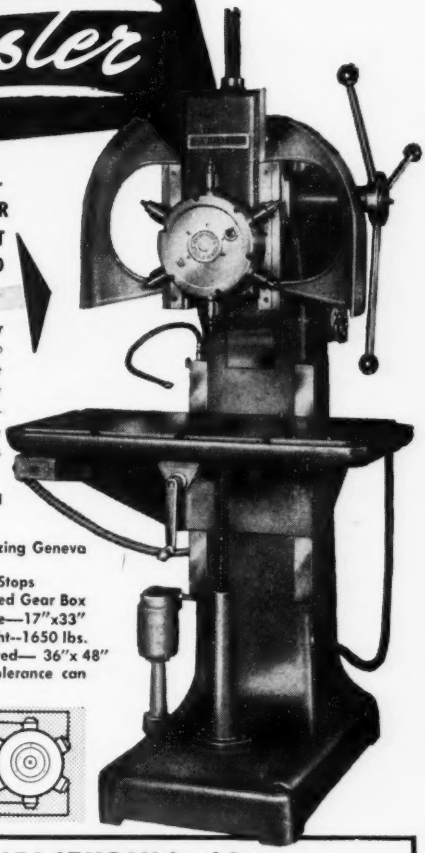
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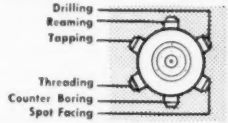
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The No. 2 Model A BURGMASTER will definitely cut your second operation costs because: Loss of time due to movements of parts from one spindle to another are eliminated; Close tolerances on size and concentricity are easily maintained; Set-up is simple and fast—unskilled operators can run the machine; Less floor space and power required; Rigidity, power and spindle speeds permit the use of high cutting speeds.

Now equipped with Warner electric clutch units in speed change mechanism.

- ★ ¾" Drill Capacity
- ★ ½" Tap Capacity
- ★ 1 to 2 H.P., 2 speed, 3 phase, 60 cycle Motor
- ★ 12 Spindle Speeds, ranging from 225-3000 R.P.M
- ★ 4 Speeds, pre-selective per spindle, at any one setting
- ★ 8" Ram Feed
- ★ 19" Table Travel
- ★ Throat Depth—11-5/16"
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- ★ Power Index, utilizing Geneva Mechanism
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- ★ Completely Enclosed Gear Box
- ★ Table work surface—17"x33"
- ★ Approximate weight--1650 lbs.
- ★ Floor space required— 36"x 48"
- ★ Extremely close tolerance can be held



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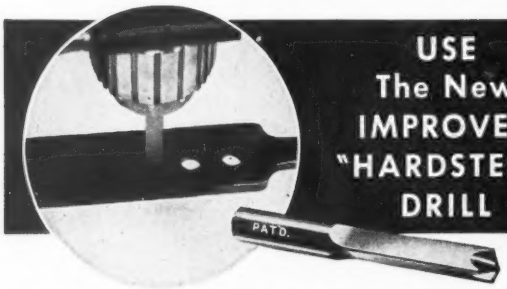
BURG TOOL MANUFACTURING CO. DEPT. MM-12
3743 DURANGO AVENUE • LOS ANGELES 34, CALIFORNIA

mined for a specific design which then will remain a constant value. Removal of any decarburization which may appear on either forging or bar stock will assure the maintenance of the proper case characteristics. The presence of decarburization will result in the production of a brittle case upon being nitrided and may ultimately spall while in service.

In many instances, especially where items will be machined directly from bar stock, the nitriding analysis is purchased in the 'as heat treated' condition. However, in the event that bar stock is to be forged into component parts, the use of heat treated bar stock is not required since the effects of the heat treatment will be destroyed upon heating for forging. In this event, the operations that would follow forging would generally consist of (a) anneal for machinability; (b) rough machine; (c) heat treat to obtain the 'sorbitic' structure; and, (d) final machining or grinding. Sufficient stock should remain for final machining so as to assure complete removal of the decarburized layer.

In forging, the temperature will vary from 1950 to 2200 degrees Fahr. for the nitralloy compositions listed. The only exception to this would be the graphitic nitralloy composition, the temperature of which should not exceed 1950 degrees Fahr. Typical procedures to be followed for annealed, heat treated and forged Nitralloy

Drill Hardened Steels without Annealing –



With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon–high chrome steels of any degree of hardness.

"HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly.

Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are cutting costs in thousands of plants.

You Harden It—We'll Drill It—
With "HARDSTEEL"

BLACK DRILL COMPANY, INC.
1372 East 222nd St. • Cleveland 17, Ohio

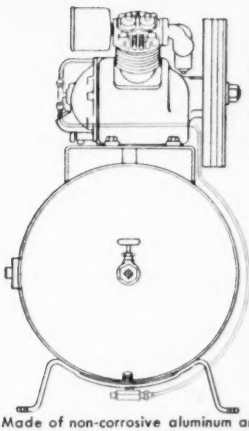
Also makers of—
BLACK DRILLING UNITS—AUTOMATIC, SELF-CONTAINED—FOR COST-CUTTING PRODUCTION ON ALL MATERIALS
Write for information

Keep water out of your air tank with this new

WESTINGHOUSE

C-1 Automatic Drain Valve

COMPLETELY AUTOMATIC • LOW IN COST
EASY TO INSTALL



Made of non-corrosive aluminum and oil-resistant rubber, the Westinghouse C-1 Automatic Drain Valve is installed on the bottom of the tank or aftercooler.



Operating pressure for the C-1 Automatic Drain Valve is obtained from the oil unloader pipe on a "start-stop" unit or the unloader pipe from the pilot valve on a "load-unload" operating unit.

● Let the new Westinghouse C-1 Automatic Drain Valve take over the job of keeping water out of your air tank. It's completely automatic in operation . . . there's no day to day manual draining, or, worse, no forgetting to drain. It eliminates the need for drip pans, drain lines or sewage connections.

Every time your air compressor starts, stops or unloads, the C-1 Automatic Drain Valve goes into action. Its piston—the only moving part—moves between the extended and retracted position, expelling collected water into the air as vapor.

Air pressure from the unloader pipe of your air compressor operates this Drain Valve which may be installed on the tank or aftercooler.

Everything you need for quick, easy installation—including all fittings and tubing—is furnished in a complete kit. The C-1 Automatic Drain Valve is available for all models of Westinghouse Air Compressors and fits most units of other makes as well (lever type unloaders excepted).

A water-free air supply is a must on most types of pneumatic equipment; it will help you get longer, trouble-free service from every type. Get full information on the Westinghouse C-1 Automatic Drain Valve from your Westinghouse Air Compressor dealer.

Westinghouse Air Brake
COMPANY

INDUSTRIAL PRODUCTS DIVISION **WILMERDING, PENNSYLVANIA**

Factory Branch: EMERYVILLE, CALIF. Distributors throughout the United States . . . Consult your Classified Directory. Distributed in Canada by: Canadian Westinghouse Co. Ltd., Hamilton, Ontario.

135 and Nitralloy 135 modified are given below:

I. Procedure No. 1—Nitralloy 135 and 135 Modified in the Annealed state.

1. Rough machine the annealed material. Leave at least 1/32 to 1/16 inch on a side for final machining after heat treatment. The annealing can be performed by heating to 1700 degrees Fahr. followed by slow cooling. Softening can also be obtained by subjecting hot rolled bars to a sub-critical anneal at 1250 to 1300 degrees Fahr.
2. Heat to 1700 to 1750 degrees Fahr. Quench in oil or water, preferably the latter, when sections exceed one inch in thickness or diameter. The recommended time at temperature for the various sections if heated slowly to the quenching temperature are approximately as follows:

One inch or less ..... One-half hour
Over one inch to two inches inclusive ..... one hour
Over two inches to three inches inclusive ..... one and one-half hours
Over three inches to four inches inclusive ..... two hours

3. Temper at 1000 to 1300 degrees Fahr. depending upon the desired core hardness. Hold at temperature for one hour or more depending upon the size of the section. At least one hour per inch of thickness should be used.
4. Finish machine or grind.
5. Nitride.

II. Procedure No. 2—Parts machined from heat treated bar stock.

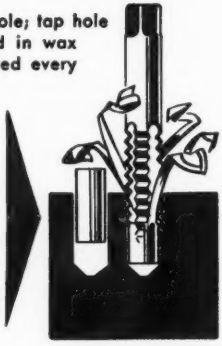


STOP the major cause of
TAP BREAKAGE

increase tap life 5 to 10 times with **TAP-CARTRIDGES**

Drop TAP-CARTRIDGE into drilled hole; tap hole through cartridge; chips are imbedded in wax and forced out of hole. Tap is protected every thread of the way.

- very economical
- saves time and labor
- eliminates torn threads
- no cleaning-out operation required
- facilitates thread-cutting to bottom of hole
- available for tap sizes from No. 2 up and for any depth of drilled hole



For full details write to the . . .
TAP-CARTRIDGE CO.
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Easily machined for MANY PARTS

JOHNSON UNIVERSAL BRONZE

IN addition to free cutting properties, Johnson UNIVERSAL BRONZE comes to you completely finished, ID, OD and ends. You can see how this saves you time and money. There are over 400 sizes available from your Johnson Distributor. Applications include gears, rollers, sheaves, trolley wheels, tips for air tools, pipe fittings, washers, thrust plates, bushings and bearings . . . . . .

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JOHNSON JB BEARINGS
Sleeve-Type



SLEEVE BEARING HEADQUARTERS SINCE 1901.

WRITE for catalog showing sizes in stock or consult your local Johnson Distributor

cut power blade costs at least 15% with

VICTOR "Moly"® Blades

Yes, that's right—when you order VICTOR Moly Power Blades from your Distributor, you cut your initial blade cost 15%, and you'll get extra economies through faster, more efficient cutting and longer blade life.

Over the years, *quality* has made VICTOR Blades the blades industry prefers.

YOUR DISTRIBUTOR HAS VICTOR BLADES IN STOCK

For VICTOR Blades — as well as hundreds of other products you regularly buy — your Industrial Distributor is the man to call. He is close to your problems. He gives you fast service. He has the assistance of trained factory representatives in solving many of your every day production problems. Buy all you can from him.

VICTOR Hand and Power Hack Saw Blades Are Sold Only Through Recognized Distributors. 1824

VICTOR

SAW WORKS, INC. • MIDDLETOWN, N. Y., U.S.A.

Makers of Hand and Power Hack Saw Blades, Frames and Metal Cutting Band Saw Blades

1. Rough machine. Leave about 1/32 inch on a side for finish machining or grinding. In many instances, only a few thousandths may be necessary.
2. Stress relieve by reheating to 1100 to 1200 degrees Fahr. Hold at temperature for one hour or more depending upon the size of section. Ample time for stress relieving should be allowed whenever this operation is demanded. This is especially true when freedom from distortion during nitriding is desired.
3. Finish machine or grind.
4. Nitride.

III. Procedure No. 3—Parts machined from forgings.

1. Anneal forgings by heating to 1700 degrees Fahr. followed by slow cooling and then follow the operations as given in Procedure No. 1.

An alternate treatment is as follows:

1. Normalize the forgings by heating to 1800 degrees Fahr. followed by cooling in still air.
2. Heat to 1700 to 1750 degrees Fahr., quench in oil or water, preferably the latter, when the sections exceed one inch in thickness or diameter.
3. Temper from 1100 to 1300 degrees Fahr. depending upon the desired core hardness.
4. Rough machine.
5. Stress relieve by reheating to 1100 to 1200 degrees Fahr. Hold at temperature for one hour or more depending upon the size of section.
6. Finish machine.
7. Nitride.

(To be continued in March Issue)

THEY CAN TAKE IT...and DO!
...and still maintain accuracy

STANDARD *Dial Indicators*

Built to stand the knocks—*often unavoidable*

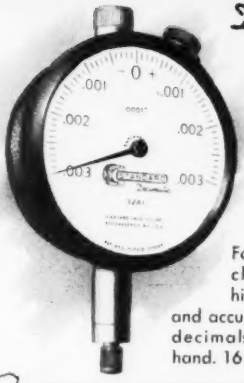
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REGULAR
AGD SERIES

AGD SPECIFICATIONS THROUGHOUT

Made in 22 models including 4 dial diameters, 7 different graduations. Also 90° models (stem perpendicular to back). Long Range and Long Stem types.



Decimatic
SERIES

AGD SPECIFICATIONS except Range and Marking

For especially fine checking, extra high repeatability and accuracy. Marked in decimals. No whip of hand. 16 models.

This One Was New... *Years Ago* - Still Serviceable



Obviously it has withstood hard usage, yet indicators such as these are constantly being reconditioned (at a fraction of the original cost) — to return still more dependable service to the owner.

You wouldn't treat your watch the way some indicators have to be treated. Standard Dial Indicators are built to give continuing accuracy while standing the knocks.

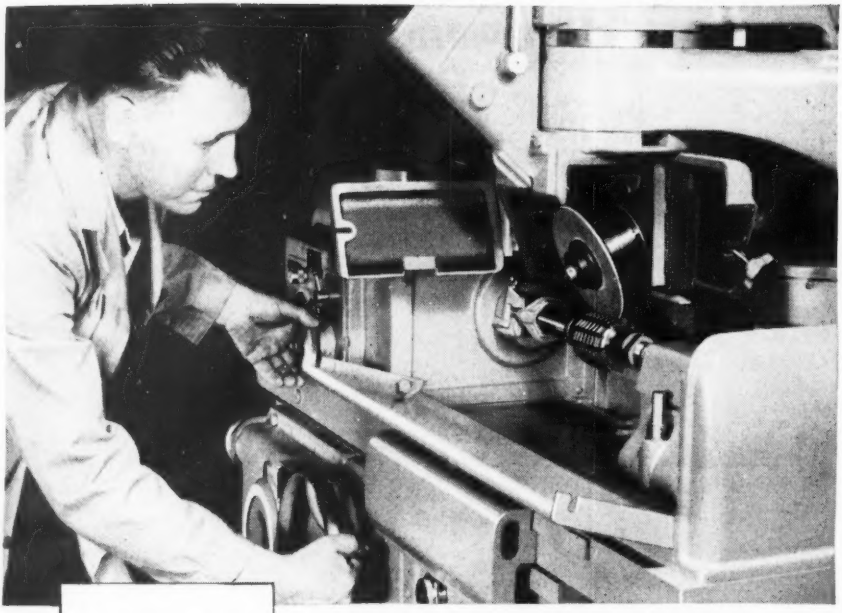
Outstanding Reason for the Durability Built into Standard Indicators is the

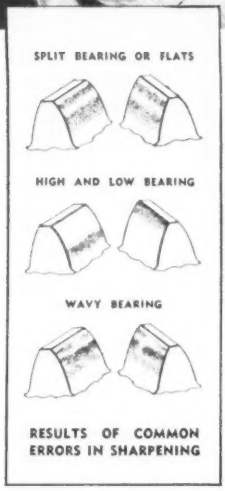
SHOCKPROOF MECHANISM



Proved by experience to prolong instrument life greatly, Standard's Shockproof Mechanism protects internal parts right from the spindle on. Furnished regularly in most models, not treated as an optional extra. Standard Indicators give longer, trouble-free life, need fewer repairs, are dependable. These facts add up to "Greater Economy."

STANDARD GAGE CO., Inc., *Poughkeepsie, N.Y.*





Proper Hob Sharpening

IS ESSENTIAL FOR ACCURATE ECONOMICAL GEAR PRODUCTION

The accuracy for which you pay in your hobs, machines, blanks, tooling and labor — is lost immediately when incorrectly sharpened hobs are used to cut gears.

Without precision control of your sharpening, the lead and tooth profile may lose their original accuracy. This loss of accuracy produces faulty, noisy gears, rejects, increased inspection time, and unnecessary non-productive machine time.

To maintain top accuracy and efficient, economical gear production, it is essential to have correctly sharpened hobs. Barber-Colman Sharpening Machines offer positive mechanical control over sharpening elements. These machines provide the means for sharpening hobs to their original tolerances.

BUILDERS OF PRECISION GEAR

SAVES TOOL COSTS

When properly sharpened, your hobs cut more pieces between sharpenings, and less stock is removed per sharpening, resulting in an overall increase in hob life. Using Barber-Colman positive mechanical control, all teeth are uniformly sharpened to original tool accuracy.

SAVES INSPECTION TIME

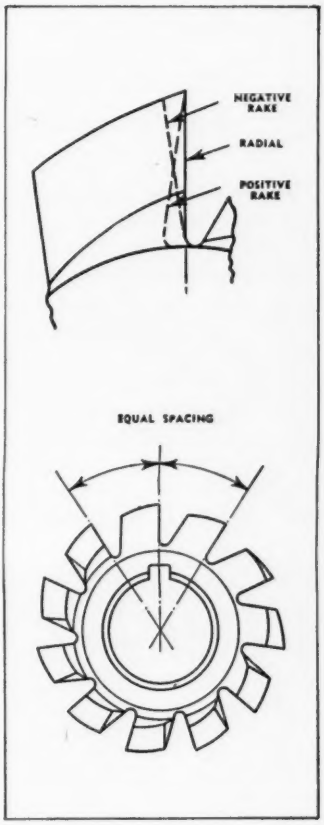
Correctly sharpened tools eliminate cut and try methods on the hobbing machine. Repeated inspections while setting up a job can be reduced considerably by reproducing the original accuracy of the hob. Correctly sharpened tools reduce finished inspection time to a minimum.

SAVES PRODUCTION TIME

Long wearing, accurately cutting hobs reduce machine stoppages to a minimum. Duplication of accuracy and form is consistent, promoting a smooth flow of production pieces. With this dependable cutting efficiency, the number of pieces per hob sharpening can be accurately determined, allowing the tools to be changed at the most conveneint time. Loss of machine output due to frequent hob changing is avoided.

SHARPENING SERVICE

Barber-Colman offers a complete sharpening service to all hob users. Features such as radialism or rake offset, high helix angles, and flute spacing are sharpened easily with Barber-Colman positive mechanical control. A Barber-Colman Field Engineer will consult with you on your special problems. Take advantage of this complete service and ask for recommendations today.



HOBS • CUTTERS • REAMERS
HOBBING MACHINES
HOB SHARPENING MACHINES

BARBER COLMAN

Barber-Colman Company

GENERAL OFFICES AND PLANT 712 ROCK STREET, ROCKFORD, ILLINOIS

HOBS AND MACHINES SINCE 1911

Efficient Shop Promotions . . . By Gilbert C. Close

This story tells how North American Aviation finds the right men to fill supervisory positions.

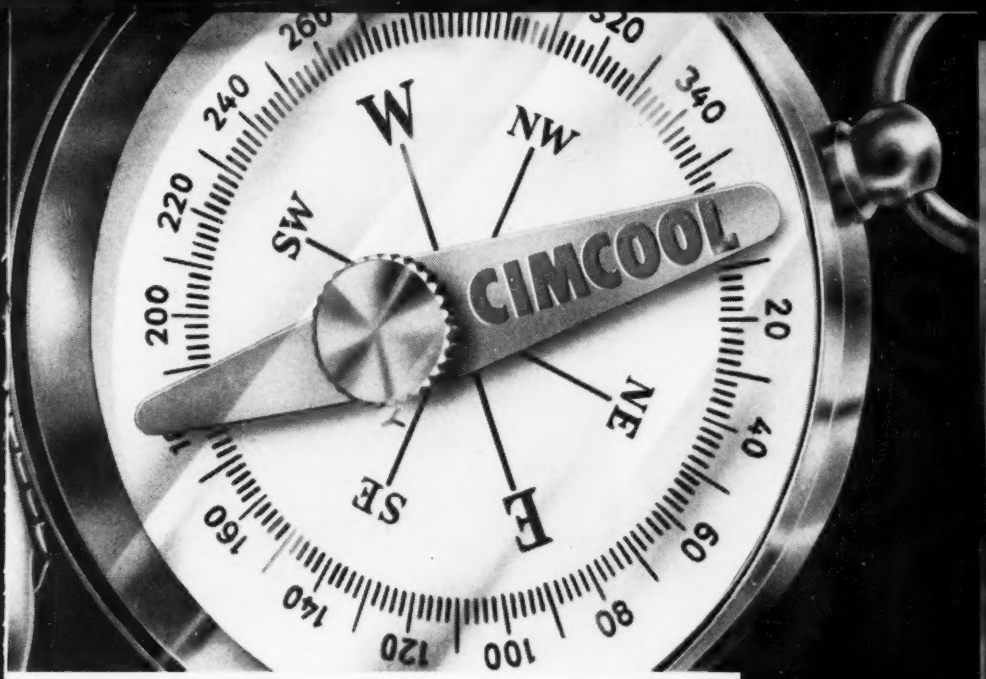
THE increasing complexity of modern industry has placed a premium on supervisory talent. This is especially true in the shop departments where more and more precision is demanded from increasingly complex tools. Brains have replaced brawn in most types of shop work, and the day of the hard-boiled foreman who gets things done by assuming a "top-sergeant" attitude has faded into history. Today, efficient supervision has two prime requisites—first, the supervisor or foreman must know more about shop production problems than the employees working under him; secondly, he must be able to impart this information in an understandable and non-assuming manner.

It is not a simple task to select the right shop employee from among hundreds for promotion to a higher level job. Among these hundreds, dozens will be highly efficient at their particular job, but will lack other characteristics necessary in supervisory work. Seniority must not be controlling factor except when all other factors are even. In the interest of a sound working organization, all taints of favoritism must be rigidly avoided.

To solve the problem of shop promotions and to assure selecting the right man for the job, management at North American Aviation, Inc., established the Supervisory Selection Board sys-



Here Peter Sudo, North American foreman, gives advice on an assembly operation. Sudo started as a rivet bucker, made a good record, and was advanced accordingly by the Supervisory Selection Board.



Pointing The Way To Lower Costs

Plant after plant, in every compass direction, has found that Cimcool° is a short and easy route to lower costs. And this revolutionary cutting fluid—this *chemical emulsion*—does a *better job*, while saving money three important ways:

CIMCOOL INCREASES TOOL LIFE (and thus reduces down time) because of its chemical lubricity.

FASTER SPEEDS are possible because Cimcool cools faster, through a unique physical change in the cutting fluid itself. Tools and chips actually stay cool to the touch.

CIMCOOL COSTS LESS than old-fashioned cutting fluids because it lasts longer. It also cuts labor costs for cleaning and changing. It virtually eliminates rancidity and foul odors. And because of its low surface tension and low adhesion to work and chips, there is practically no carry off.

For a demonstration, write us and we'll have one of our Cincinnati Milling-trained machinists call on you—without cost or obligation. Or, if you prefer, write for our free booklet "CIMCOOL Defeats Heat." Address, Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

°Trade Mark Reg. U.S. Pat. Off.

A Production-Proved Product of
THE CINCINNATI MILLING MACHINE CO.



for 85%
OF ALL METAL CUTTING JOBS



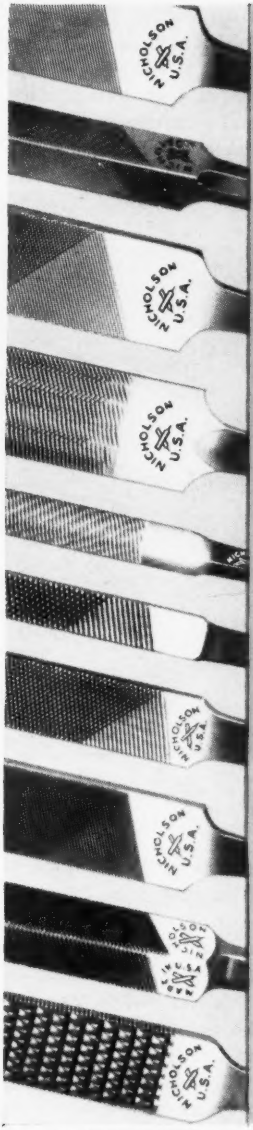
Roy L. Ashley, who started work as a department clerk, is now a foreman. Here he discusses a transportation problem with a North American truck driver.

tem. Purpose of this Board is to process all shop promotions, taking into consideration every factor that will influence the supervisory capacity of those being considered for the new job. This "processing" is somewhat long and involved, but results obtained since establishment of the Board in 1945 is ample proof of its value. Since its establishment, the Board has handled 3,265 job promotions, ranging all the way from working leadmen to departmental heads. It functioned just as well during the lean period of employment immediately following the war as it does today.

Among noticeable advantages that have accrued from this system of promotion are (1) improved employee and supervisory morale by assuring advancement on the basis of merit, and by giving consideration to the interests and opinions of immediate supervision; (2) provisions for fair dealing in departmental organization; (3) provides a more adequate and objective basis for promotion; (4) discovers potential supervisory personnel and specific training needs; (5) establishes a measuring stick for selecting supervision; and (6) places increased emphasis on presenteeism and compliance with rules and regulations as factors influencing advancement.

As an example of how the Supervisory Selection Board works, this is the routine that would be followed to fill a "leadman" vacancy . . .

Upon certification of the job opening, a request is made to the Board to fill the vacancy. This brings about nominations of prospective candidates. The first step by the Board is to find out if all those nominated wish to be considered for the opening. For those who do, job records are checked, including attendance and past experience. But this is not all. An employee might be well qualified under all the above, yet still lack qualities of leadership. The next step is to get unsigned appraisals from fellow workers regarding the individual's ability and his leadership value. These fellow worker appraisals have been found to be very fair and enlightening. In addition to this, supervision in the next two levels above the



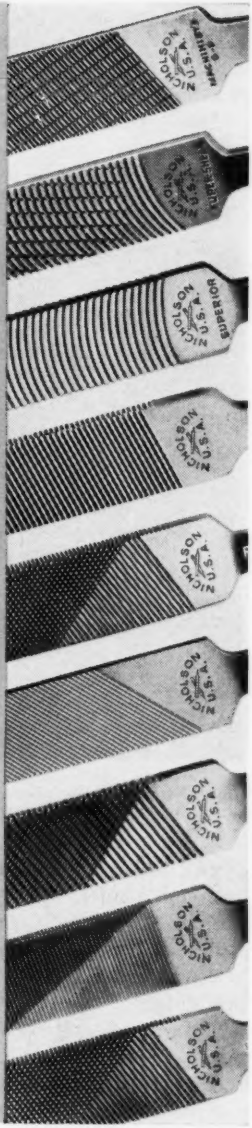
The right file for the job...

and Twelve perfect files in every dozen

Through four generations of Nicholsons the above two slogans have been interwoven with the aims and policies of America's foremost file manufacturer. Here they have inspired every development in file engineering; guided every stage of file manufacture; spearheaded every phase of service to the industrial user. They definitely lead to better work, higher production, lower filing costs. Thousands of kinds, cuts and sizes—*obtainable through your Industrial Distributor.*

FREE BOOK, "*FILE FILOSOPHY*," on kinds, use and care of files.

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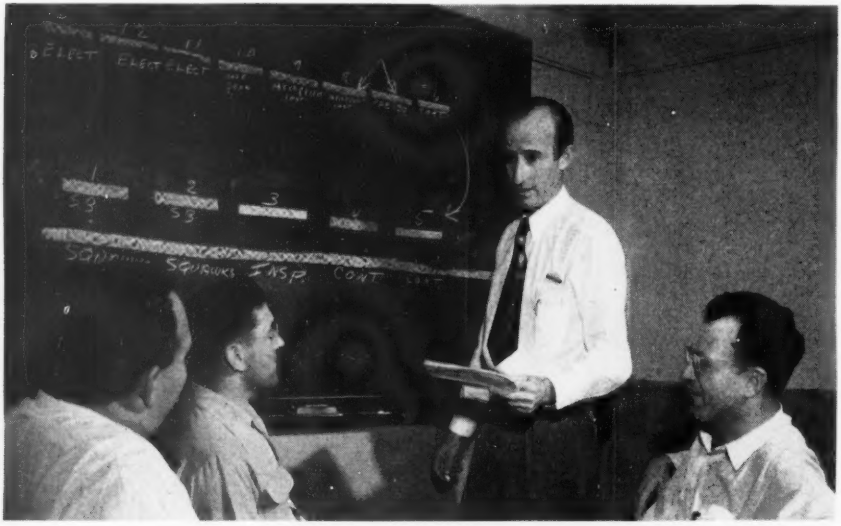
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vacancy are asked to give an objective ranking of the candidates and to comment in their own words on the qualifications of each.

These supervisory recommendations are made on forms, and each person handling the forms is requested to rate the candidate on "Drive," "Job Knowledge," "Ability to Instruct," "Organizational Ability," "Safety Consciousness," "Loyalty," "Enforcement of Rules and Regulations," "Cost Consciousness" and "General Impression on Others."

Then to eliminate any partiality that might be included in the supervisory recommendations, all candidates considered qualified for the opening are given a comprehensive test. Intelligence tests and trade tests come first, followed by a written test concerning knowledge of the specific job.

With this data on hand, the Supervisory Selection Board makes the final two steps necessary before the appointment is made. A summarization of both tests and recommendations is made on a separate form listing 19 items which represent the composite list of factors most important in selecting the right man for a supervisory position. The first nine of these items are: Work record previous to North American employment, Service Record at NAA, Education, Education since starting work at NAA, Warning Notices, Number of Days Absent in last Six Months, Job Knowledge, Mental Ability (by test), and Additional Qualities. Information for these nine items is obtained from application blanks, Kardex files, employee folders and test results. Items 10 through 19 are those factors on which the candi-



Here Chas. Hamilton, General Foreman, illustrates a problem to three foremen under his supervision. All four men were selected for their jobs by the Supervisory Selection Board.

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with GULF CUTX B



Material—17 ST Aluminum Alloy; Operation—Turn, face, bore, and thread projectile fuse; Machine—6 spindle Conamatic; Cutting Oil—Gulf Cutx B, which proved superior to 4 other cutting oils by actual comparative tests; other benefits with Gulf Cutx B—better threads and longer tool life.

Another example of improved machining practice with Gulf Quality Cutting Oils! Call in a Gulf Sales Engineer today and let him help you find opportunities for greater production at lower cost through the use of the right Gulf cutting oil for the job. Write, wire, or phone your nearest Gulf office.

GULF SERVES INDUSTRY

GULF OIL CORPORATION
GULF REFINING COMPANY
Pittsburgh 30, Pennsylvania



Oscar Lee (left) started work as a painter's helper, but his record was brought to the attention of the Supervisory Selection Board. Now Lee is a foreman in one of the shop departments. Here he is shown discussing a machining problem with one of his men.

date is rated by supervisors and fellow workers.

The Supervisory Selection Board then takes this composite form under consideration, weighs each factor carefully and balances it against all others, and makes the final selection accordingly.

For the most part, members comprising the Board are changed with each job opening, and usually consist of Supervision over the job opening, the Division Head or his representative, and the Director of Industrial Relations or his representative.

The successful administration of the Board since its establishment has resulted in some interesting conclusions being drawn from studies of the promotions made. Age seems not to influence successful candidacy. Both successful and unsuccessful candidates average between 34 and 35 years of age. Formal schooling does not appear to be particularly significant. Both the average successful and unsuccessful candidates have finished high school. Service with the company seems most significant in promotions to higher level supervisory jobs.

While shop promotions made in this manner seem "the long way around the problem," North American officials consider the results well worth the effort. After all, when a man is promoted to a supervisory level, he is in a position to directly influence the work of a department containing dozens or even hundreds of employees. The time and effort spent in selecting the right man for such a position becomes trivial in comparison to the production time he will influence once he is installed in his new position.

Illustrations furnished through courtesy of North American Aviation, Incorporated.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.



Safest, Straightest-Cutting, Most Durable Blade Ever Made

Starrett

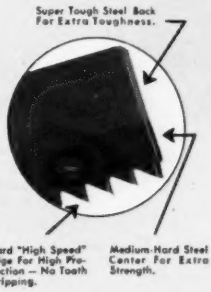
SAFE-FLEX HIGH SPEED WELDED EDGE POWER HACKSAW BLADES

IT'S SHATTERPROOF!

Double welding makes Starrett SAFE-FLEX Power Hacksaw Blades the safest, straightest cutting, long-lasting blade ever made. Use it with complete safety for your toughest cutting jobs — for multiple sawing work or interrupted cuts. Use it with greater economy for *all* your power cutting. Step up the speed and feed. Watch it cut clean and fast with no danger of shattering.

Double welded construction, an entirely new development in hacksaw design, gives Starrett SAFE-FLEX blades the perfect combination of hardness and toughness. The cutting edge of hard, high speed steel is reinforced with a medium hard, extra strong center and backed up with a super-tough steel back. See what the new Starrett SAFE-FLEX blade can mean to you in more and straighter cuts per blade. Order a supply today.

Here's what DOUBLE-WELDED SHATTERPROOF CONSTRUCTION MEANS



STARRETT TOOLS

TRADE MARK
Starrett
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SINCE 1880
WORLD'S GREATEST TOOLMAKERS



THE L. S. STARRETT COMPANY
Athol, Massachusetts, U. S. A.

MECHANICS' HAND MEASURING TOOLS AND PRECISION INSTRUMENTS
DIAL INDICATORS • STEEL TAPES • PRECISION GROUND FLAT STOCK
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Buy THROUGH YOUR INDUSTRIAL DISTRIBUTOR
Prompt delivery
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Here's the start...

of the new concept that created CINCINNATI Grinding Wheels

Cincinnati Grinding Wheels began with a frank recognition of the grinding grit as a cutting tool. For research discoveries by Cincinnati Milling proved, beyond doubt, that the grinding process is a true metal cutting process. The grinding grits (such as the one magnified above) do not abrade or wear away the surface of a workpiece but form chips which agree in classification with the basic chip types found in other metal cutting processes.

This entirely new approach is not based on hasty conclusions. It represents 25 years of Cincinnati Milling research, coupled with practical experience

in applying the basic fundamentals of grinding to a wide variety of work on both centerless and centertype machines.

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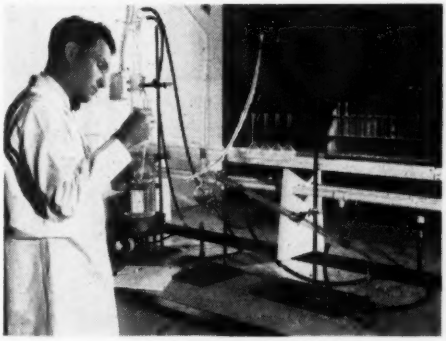
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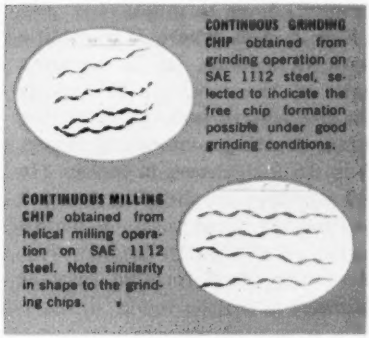
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RESEARCH GRINDING problems have ranged from the grinding of surgical sutures .0004" in diameter to steel mill rolls 60" in diameter. A machinist of the research department is shown using special workpieces to compare wheel performance on a centertype grinder.

EXTRACTION APPARATUS is used by research laboratory to measure degree of maturity of resin bonds.





CONTINUOUS GRINDING CHIP obtained from grinding operation on SAE 1112 steel, selected to indicate the free chip formation possible under good grinding conditions.

CONTINUOUS MILLING CHIP obtained from helical milling operation on SAE 1112 steel. Note similarity in shape to the grinding chips.

FREE BOOKLET. Now available to industry is a new booklet entitled "A New Concept In Grinding Wheels." It contains valuable information for everyone interested in grinding operations. A copy is yours for the asking. Write Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

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Die Plate Calculation

By Federico Strasser

Three steps, including formulas, for performing this work are presented.

WHENEVER the question of how to calculate die plates arises, the usual answer is that the dimensions are determined by judgment and practical experience, supplemented by machine design principles. In the desire to provide the beginner with a guide

Table I

Metal	Ultimate shearing strength, in lb./sq.in.
nickel	60 — 75.000
hard steel	45 — 60.000
mild steel	40 — 50.000
brass	35 — 40.000
copper	28 — 30.000
zinc	18 — 20.000
aluminum	15 — 19.000
tin	5.000
lead	4.000

which can serve as a basis on which to form his own proper criterion, the author presents in this article a simple method for the calculation of die plates.

The process of calculating die plates is divided into three steps: (1) determination of die-plate height (thickness), (2) corrections, and (3) determination of die-plate surface. The die-height calculation is based upon the cutting load (cutting pressure) by means of the following empirical formula:

$t = \frac{\sqrt[3]{P}}{33}$, where **t** is die-plate thickness in inches and **P** is cutting pressure in pounds.

On the other hand, the cutting pressure is determined by following the universally known formula:

$P = K \times A \times S$, where **P** is cutting pressure in pounds, **K** is shearing strength of the stock to be cut in pounds per square inch, **A** is cutting perimeter (cutting contour) in inches, and **S** is stock thickness in inches. (In **Table I** are listed the shearing strength factors for the most common metals utilized in die work.) Consequently, the first mentioned formula may be transformed thus:

$$t = \frac{\sqrt[3]{K \times A \times S}}{33}$$

In order to eliminate the need for cube root computations, we present in **Table II** the calculated approximate values of $\sqrt[3]{K \times A \times S}$; 33 for die-plate heights from ¼ to 2-inch thicknesses. After the preliminary calculation, the following corrections must be made:

(a) Under no circumstances are allowed die plates thinner than 0.3-0.4 inch. Even if the calculations should give smaller values, one must increase them up to 0.3 inch for die surfaces

less than 5 square inches and 0.4 inch for die surfaces greater than 5 square inches.

(b) The formulae given above are obviously for comparatively small dies; i.e., with cutting perimeter less than 2 inches. In the case of longer cutting edges, the results obtained by the formulae must be multiplied by the corresponding factors given in **Table III.**

(c) In every case, it is assumed that the die plate is made from first grade tool steel, correctly machined and accurately heat treated. In the case of special tool steel with very high tensile strength, one can decrease the calculated values of die thicknesses; vice versa, if there is doubt that the heat treatment will not be adequate, it is convenient to increase the calculated values.

(d) Die plates must always rest on flat bases (die shoes or die holders) since, if dies are directly placed upon large bolster-plate openings (or press-table openings) they must resist too heavy flexural stresses. If dies are enclosed conveniently in die shoes (inserted in holes with drive fit), the thicknesses can be decreased (up to 50 per cent) because of strong side support.

(e) In the case of high-production tools where a large number of regrindings will be required, one must take such a factor into consideration by allowing 0.01 to 0.02 inch for each grinding.

(f) In every case, the final value must be carried out to a round (large) fraction of an inch minus ⅛ inch. In other words, the steel is purchased in round inch thicknesses (i.e., ½ inch, ¾ inch, 1 inch, 1½ inches, 1¾ inches, and so on) and from each side is a

Table II

P = K.A.S. lbs.	Die-plate thickness inches	
560	1/4	.2500
800	9/32	.2812
1.100	5/16	.3125
1.460	11/32	.3437
1.900	3/8	.3750
2.400	13/32	.4062
3.000	7/16	.4375
3.700	15/32	.4687
4.500	1/2	.5000
5.360	17/32	.5312
6.430	9/16	.5625
7.530	19/32	.5937
8.740	5/8	.6350
10.060	21/32	.6562
11.500	11/16	.6875
13.300	23/32	.7187
15.000	3/4	.7500
17.100	25/32	.7812
19.300	13/16	.8125
21.500	27/32	.8437
24.000	7/8	.8750
26.700	29/32	.9062
29.600	15/16	.9375
32.500	31/32	.9687
36.000	1	1.0000
43.000	1-1/16	1.0625
51.000	1-1/8	1.1250
60.200	1-3/16	1.1875
70.000	1-1/4	1.2500
81.700	1-5/16	1.3125
93.600	1-3/8	1.3750
106.000	1-7/16	1.4375
121.300	1-1/2	1.5000
136.600	1-9/16	1.5625
154.000	1-5/8	1.6250
172.000	1-11/16	1.6875
191.000	1-3/4	1.7500
213.000	1-13/16	1.8125
237.000	1-7/8	1.8750
262.000	1-15/16	1.9375
287.500	2	2.0000

Table III

Cutting perimeter in inches	Increasing factor
2 - 3	1.12
3 - 6	1.25
6 - 12	1.37
12 - 20	1.50
and more	

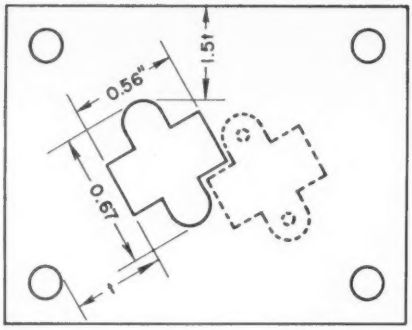


Fig. 1—The "critical distances" (i.e., distances between blanking opening edges and die-plate border) must be at least 1.5 to 2 times the die thickness in small dies and 2 to 3 times the die thickness in larger tools.

decarburized layer of approximately $\frac{1}{16}$ inch must be removed.

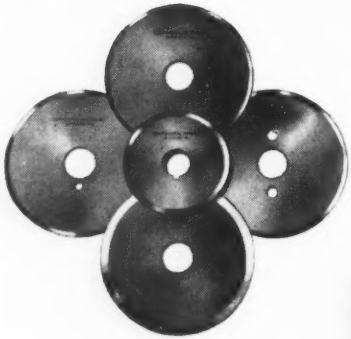
The die-surface determination is part of the regular design of the tool. The only mathematical rules are these:

(a) The "critical distances" (i.e., distances between blanking opening edges and die-plate border; see Fig. 1) must be at least 1.5 to 2 times the die thickness in small dies and 2 to 3 times the die thickness in larger tools. Take the lower value for simple, regular die openings and the greater values for more complicated, irregular cutting shapes.

(b) Leave between auxiliary holes (for small piercing apertures, alignment dowel pins, clamping screws, stop pins, and so on) and cutting opening edges a safe distance which corresponds to at least die-plate thickness; more if possible.

(c) Any hole in a die-plate corner must be located so that the minimum

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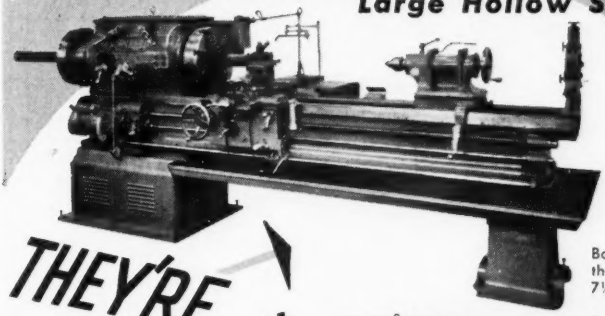
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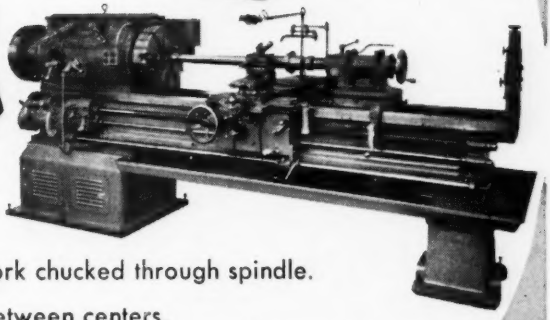
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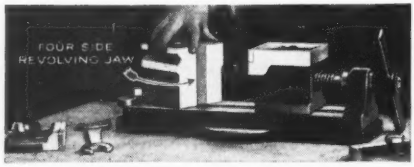
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distance between its center line and the plate edge is at least 1.5 times the hole diameter (Fig. 2).

In an actual example taken from the writer's own experience (Fig. 1), we may follow the calculation process as presented above. The basic data of this case are as follows: stock to be cut is brass, 0.08 inch thick; its ultimate shearing strength is 40.000 lb./sq. in.; the cutting perimeter is approximately 2.46 inches; and the cutting pressure is P=40.000 x 2.46 x 0.08=7,860 pounds.

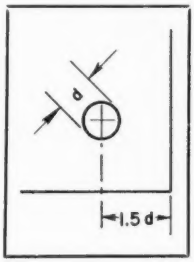
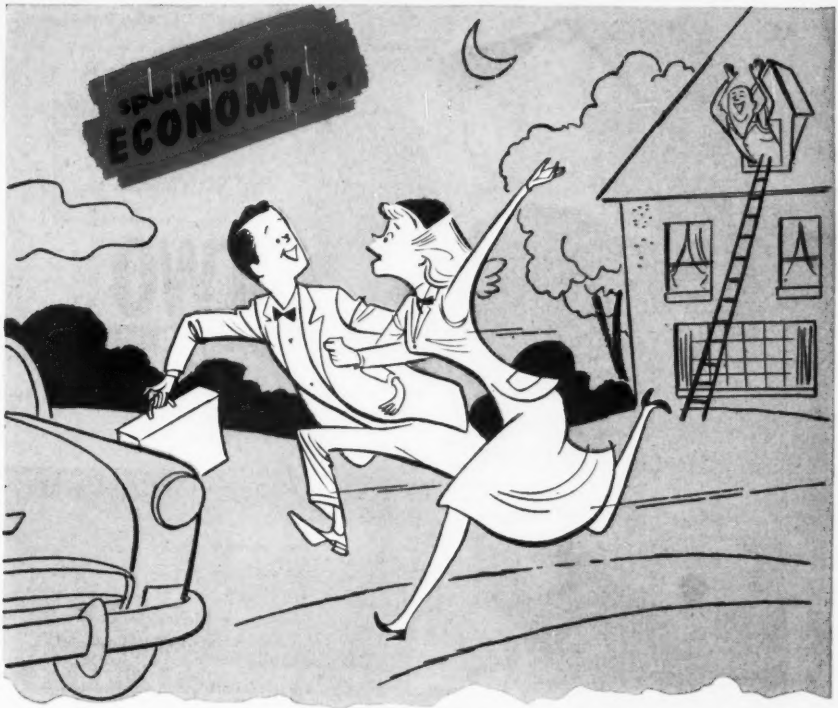


Fig. 2—Any hole in a die-plate corner must be located so that the minimum distance between its center line and the plate edge is at least 1.5 times the hole diameter.

(1) Die-thickness determination: $t=\sqrt[3]{7860} : 33=19.9 : 33=0.604$ inch

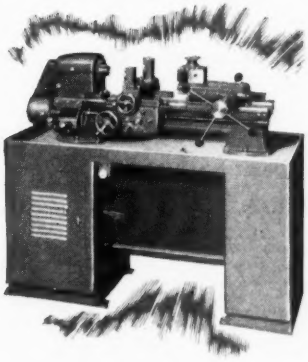
(2) Corrections: (a) is OK; (b) demands an increase of 12 per cent (i.e., the die height will be increased to 0.604 x 1.12=0.6776 inch); (c), (d), and (e) are OK; (f) requires a rounding up to ¾ inch which is the next round steel plate value (⅞ inch minus ⅛ inch).





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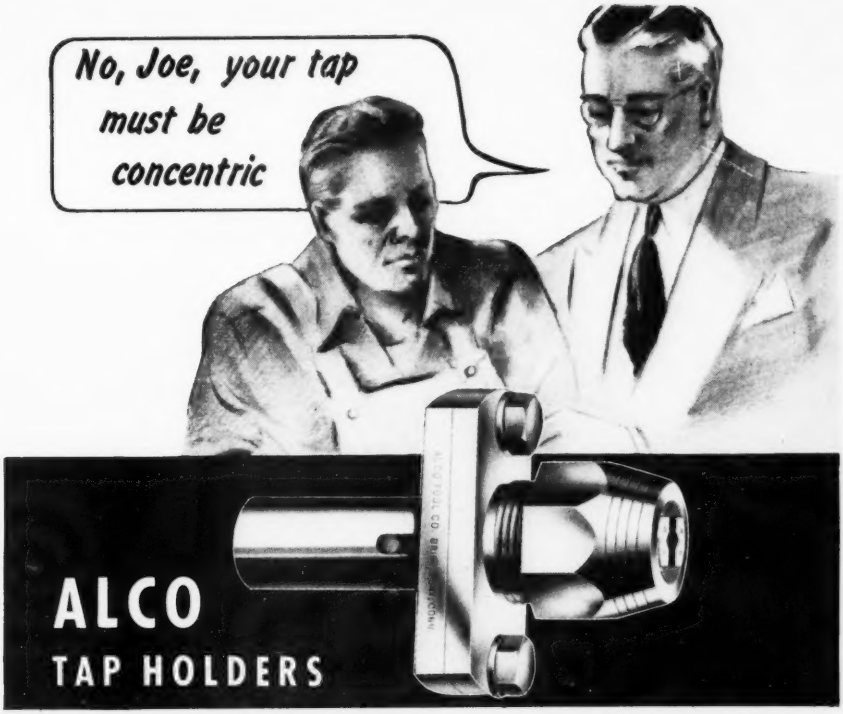
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Analyzing Business Regulations

By Robley D. Stevens
Management Consultant

In this article, the author discusses methods for figuring overtime pay in the machine shop.

PROBLEMS of wage administration are very important to machine shop management since in almost every such enterprise, labor costs—whether for foremen, timekeepers, clerks, or production workers—constitute a substantial part of the total cost of doing business. While the job of a foreman in a machine shop is primarily to get out production, the job may also entail the computation of overtime pay as required by the New Fair Labor Standards Amendments of 1949. Miscalculation of overtime pay can prove very costly.



Since the foreman in a machine shop is in so many cases considered to be an operating executive of management, he should understand the need of knowing how to figure overtime pay to fulfill his obligation to the workers and also management. Similarly, if hiring new employees is considered part of his job, no machine shop foreman should hire new employees without a knowledge of the proper methods required for computing overtime pay, since underpayments can be a real source of employee grievance and government investigations.

It is not the purpose of this article to teach the machine shop foreman payroll accounting, as that is primarily the job of the payroll clerks. However, a working knowledge of labor costs under the FLSA is a practical one, and one that needs explanation, because I have talked to numerous

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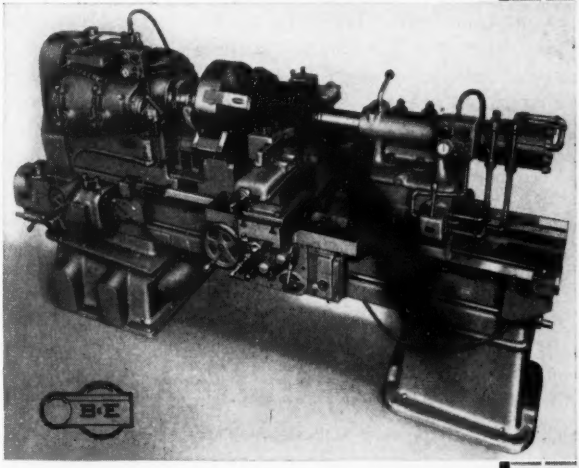
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foremen who lacked this knowledge and unwittingly caused their employers a waste of time and money.

The need for timely, meaningful wage computation data under the Federal Wage-Hour Law is as necessary for the foreman in a machine shop as it is for the foreman of any other type of enterprise, since it will aid him in keeping labor costs down and in compliance with this law. Since the enactment of the amendments of the FLSA, foremen in a machine shop should understand that their employer may not legally work employees more than 40 hours weekly unless they are (a) exempted or (b) paid time and one-half for all hours in excess thereof.



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The adequate handling of computation for overtime purposes under this monumental labor law is essential in order to comply with its basic requirements and also to aid machine shop management in precluding costly penalties. It is, therefore, important for the foreman to pay attention to the methods used, so that if and when a government inspection is ever made, the records will prove compliance.

In the way of explanation to the foreman, Section 6 of these Amendments provides for a minimum wage rate of not less than 75 cents per hour for all machine shop employees so affected. Section 7, however, deals with the maximum hours and overtime pay requirements for machine shop em-

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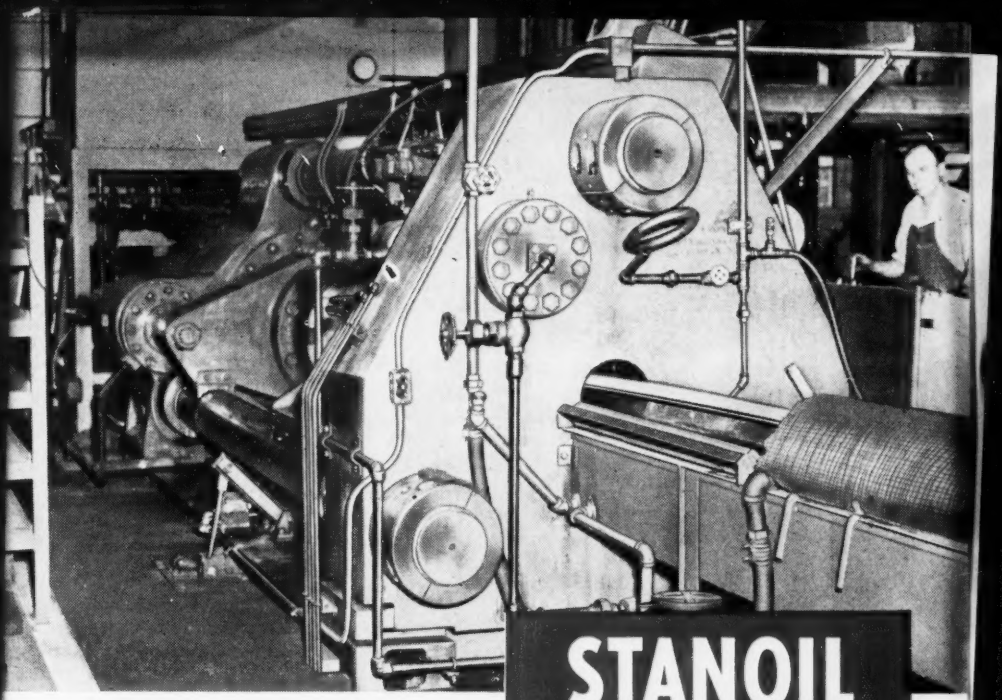
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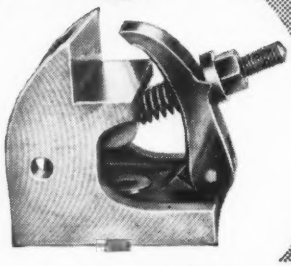
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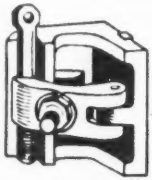
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ployees who are covered and not exempt from overtime compensation. Briefly, it provides that no employee may work in excess of 40 hours per week, unless he receives time and one-half his regular rate of pay.

The foreman in a machine shop should well understand that there is no absolute limitation on the hours of work that an employee may work if he is paid according to the above terms. The FLSA, 1949 as amended takes a single workweek as its standard. Overtime pay must be paid on the above cited terms, but the minimum wage rate cannot fall below the 75 cent minimum. However, if a machine shop employee's regular rate of pay is higher than the statutory minimum, his overtime must be computed at a rate of time and one-half times such higher rate.

It has been suggested by several foremen that I prepare a statement on how to figure overtime pay in the machine shop under the Federal Wage-Hour Law. In this instance, I am merely providing several methods that any foreman can quickly and readily understand. Thus, it is often possible for the foreman in a machine shop to glance at this computation and see which method affects the workers under him. However, it is important that the foreman understand that the term "regular rate" under the FLSA is a rate per hour. The Act does not require machine shop employers to compensate employees on an hourly rate basis; their earnings may be determined on a piece-rate, salary, commission, or other basis, but in such case the overtime compensation due to employees must be computed on the basis of the hourly rate derived therefrom

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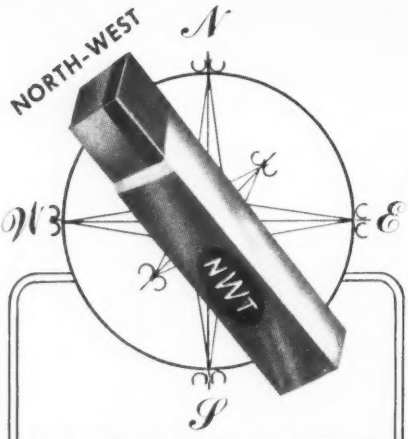


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and, therefore, it is necessary to compute the regular hourly rate of such employees during each workweek. The regular hourly rate of pay of a machine shop employee is determined by dividing his total remuneration for employment (except statutory exclusions) in any workweek by the total number of hours actually worked by him in that workweek for which such compensation was paid. Below are a few examples of the proper method of determining the regular rate of pay in particular instances which may be helpful to the foreman.



"Payments for occasional periods . . ."

Hourly Rate Employees

If the employee in a machine shop is employed solely on the basis of a single hourly rate, the hourly rate is his "regular rate." For his overtime work he must be paid, in addition to his straight-time hourly earnings, a sum determined by multiplying one-half the hourly rate by the number of hours worked in excess of 40 in the week. Thus, a $1 hourly rate will bring, for an employee in a machine shop who works 46 hours, a total weekly wage of $49 (46 hours @ $1 plus 6 hours @ 50 cents). In other words, the employee is entitled to be paid an amount equal to $1 an hour for 40 hours and $1.50 an hour for the 6 hours of overtime, or a total of $49.

If, in addition to the earnings at the hourly rate, a production bonus of $4.60 is paid, the regular hourly rate of pay is $1.10 an hour (46 hours @ $1 yields $46; the addition of the $4.60

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bonus makes a total of $50.60; this total dividend by 46 hours yields a rate of $1.10). The employee is then entitled to be paid a total wage of $53.90 for 46 hours (46 hours @ $1.10 plus 6 hours @ 55 cents, or 40 hours @ $1.10 plus 6 hours @ $1.65).

Piece Workers

When an employee in a machine shop is employed on a piece-rate basis, his regular hourly rate of pay is computed by adding together his total weekly earnings from piece rates and all other sources (such as production bonuses) and any sums paid for waiting time or other hours worked (except statutory exclusions). This sum is then divided by the number of hours worked in the week for which such compensation was paid to yield the pieceworker's "regular rate" for that week. For his overtime work the piece-worker is entitled to be paid, in addition to his weekly earnings, a sum equivalent to one-half this regular rate of pay multiplied by the number of hours worked in excess of 40 in the week. Only additional halftime pay is required in such cases since the employee has already received straight-time compensation at piece rates for all hours worked. Thus, if the employee has earned $46 at piece rates for 46 hours of productive work and in addition has been compensated at 75 cents an hour for 4 hours of waiting time,

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his total compensation—$49—must be divided by his total hours of work—50—to arrive at his regular hourly rate of pay—98 cents. For the 10 hours of overtime the employee is entitled to additional compensation of $4.90 (10 hours @ 49 cents). For the week's work he is this entitled to a total of $53.90 which is equivalent to 40 hours @ 98 cents plus 10 overtime hours @ $1.47).



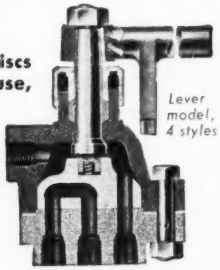
". . . in recognition of services . . ."

In some cases, an employee is hired on a piece-rate basis coupled with a minimum hourly guaranty. Where the total piece-rate earnings for the week fall short of the amount that would be earned for the total hours at the guaranteed rate, the employee is paid the difference. In such weeks the employee is, in fact, paid at an hourly rate and the minimum hourly guaranty which he was paid is his regular rate in that week. In the example just given, if the employee was guaranteed $1.10 an hour for productive working time, he would receive $50.60 (46 x $1.10) for the 46 hours of productive work (instead of the $46 earned at piece rates). In a week in which no waiting time was involved, he would be owed an additional 55 cents (half-time) for each of the 6 overtime hours worked, to bring his total compensation up to $53.90 (46 hours @ $1.10 plus 6 hours @ $1.65). If he is paid at a different rate for waiting time, his regular rate is the weighed average of the two hourly rates.

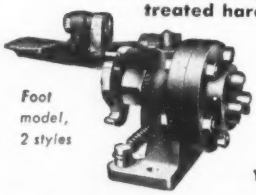
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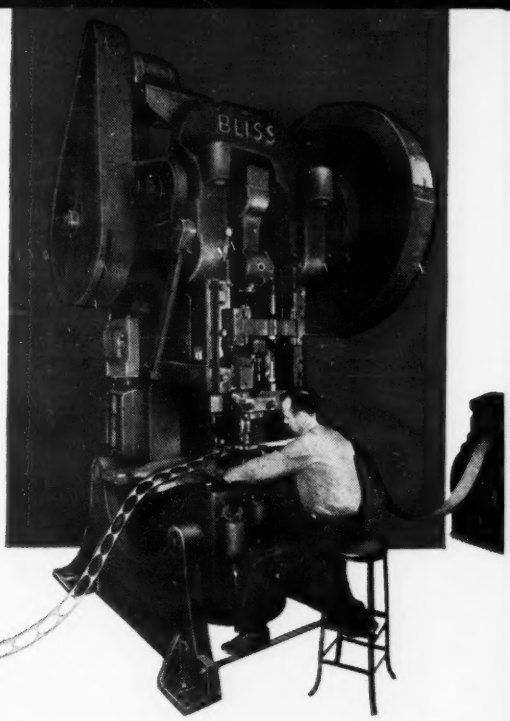
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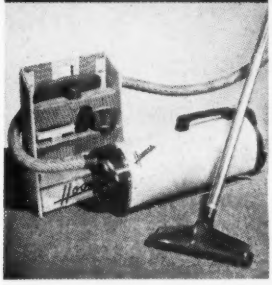
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Salaried Employees — General

If the employee in a machine shop is employed solely on a weekly salary basis, his regular hourly rate of pay, on which time and a half must be paid, is computed by dividing the salary by the number of hours which the salary is intended to compensate. If an employee is hired at a salary of $40 and if it is understood that this salary is compensation for a regular workweek of 35 hours, the employee's regular rate of pay is $40 divided by 35 hours, or $1.14 an hour, and when he works overtime he is entitled to receive $1.14 for each of the first 40 hours and $1.71 (one and one one-half times $1.14) for each hour thereafter. If an employee is hired at a salary of $40 for a 40-hour week, his regular



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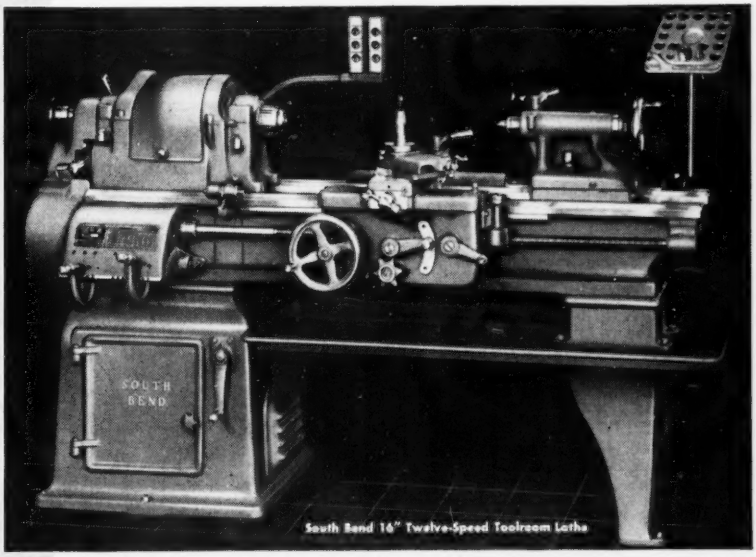
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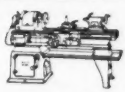
SPECIFICATIONS

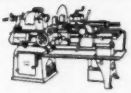
Spindle Speeds (approx.) Direct: high range 300, 550, 945; low range 150, 278, 475. Back gear drive: high range 32, 70, 118; low range 20, 33, 60.
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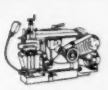

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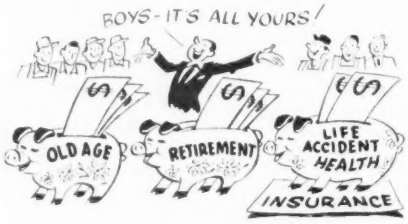

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rate is $1 an hour. If his salary is $40 for a 44-hour week, his regular rate is 91 cents per hour. Where the salary covers a period longer than a



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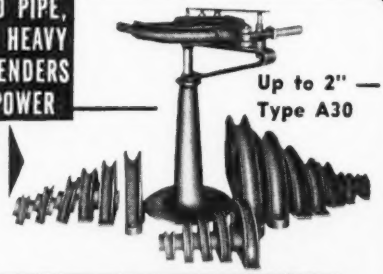
workweek, such as a month, it must be reduced to its workweek equivalent. A monthly salary is subject to translation to its equivalent weekly wage by multiplying by 12 (the number of months) and dividing by 52 (number of weeks). A semi-monthly salary is translated into its equivalent weekly wage by multiplying by 24 and dividing by 52. Once the weekly wage is arrived at, the regular hourly rate of pay will be calculated as indicated above.

Salaried Employees—Irregular Hours

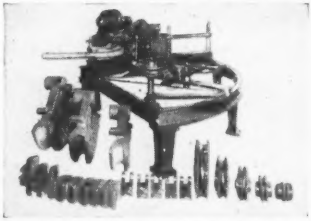
If an employee in a machine shop earns $46 per week with the understanding that the salary is to cover all hours worked and if his hours of work fluctuate from week to week, his regular rate of pay will vary from week to week and will be the average hourly rate each week. Suppose that during the course of 4 weeks the employee works 40, 46, 50, and 41 hours. His regular hourly rate of pay in each of these weeks is approximately $1.15, $1.00, $0.92, and $1.12, respectively. Since the employee has already receiv-

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ed straight-time compensation on a salary basis for all hours worked, only additional half-time pay is due. For the first week the employee is entitled to be paid $46; for the second week, $49 ($46 plus 6 hours @ 50 cents or 40 hours @ 92 cents plus 10 hours @ $1.38); for the fourth week, approximately $46.56 ($46 plus 1 hour @ 56 cents or 40 hours @ $1.12 plus one hour @ $1.68).



". . . premium rate paid for certain hours . . ."

Employees Working at Two Rates

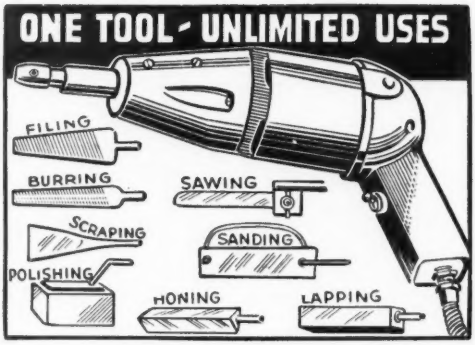
Where an employee in a machine shop in a single workweek works at two or more different types of work for which different basic hourly rates (of not less than 75 cents) have been established, his regular rate for that week is the weighted average of such rates. That is, his total earnings (except statutory exclusions) from all such rates are divided by the total number of hours worked at all jobs.

Many a foreman in a machine shop may avoid costly errors in the computation of overtime pay under the FLSA if he will merely stick to the computation methods explained above. What is more important is what payments are excluded from the "regular rate." Section 7(d) of the FLSA provides as follows: As used in this section the "regular rate" at which an employee is employed shall be deemed to include all remuneration for employment paid to, or on behalf of, the em-

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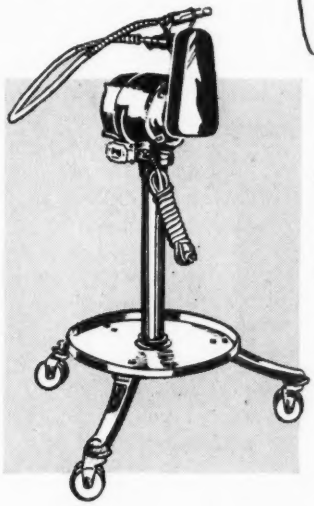
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ployee, but shall not be deemed to include:

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(2) Payments made for occasional periods when no work is performed due to vacation, holiday, illness, failure of the employer to provide sufficient work, or other similar cause; reasonable payments for traveling expenses or other expenses incurred by an employee in the furtherance of his employer's interests and properly reimbursable by the employer and other similar payments to an employee which are not made as compensation for his hours of employment.

(3) Sums paid in recognition of services performed during a given period if either (a) the fact that payment is to be made and the amount of the payment is determined at the sole discretion of the employer at or near the end of the period and not pursuant to any prior contract, agreement, or promise causing the employee to expect such payments regularly; or (b) the payments are made pursuant to a bona fide profit-sharing plan or trust or bona fide thrift or savings plan, meeting the requirements of the




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(4) Contributions irrevocably made by an employer to a trust or third person pursuant to a bona fide plan providing for old-age, retirement, life, accident, or health insurance or similar benefits for employees.



". . . premium rate paid for regular days of rest . . ."

(5) Extra compensation provided by a premium rate paid for certain hours worked by the employee in a machine shop in any day or workweek because such hours are hours worked in excess of 8 in a day or 40 in a week or in excess of the employee's normal working hours or regular working hours, as the case may be.

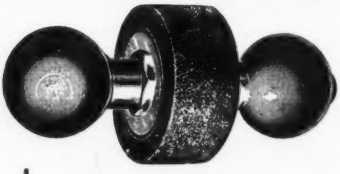
(6) Extra compensation provided by a premium rate paid for work by the employee in a machine shop on Saturdays, Sundays, holidays, or regular days of rest, or on the sixth or seventh days of the workweek, where such premium rates are not less than one and one-half times the rate established in good faith for like work performed in non-overtime hours on other days.

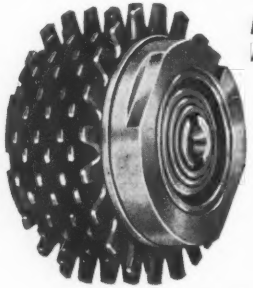
(7) Extra compensation provided by a premium rate paid to the employee in a machine shop, in pursuance of an applicable employment contract or collective-bargaining agreement, for work outside of the hours established in good faith by the contract or agreement as the basic, normal, or regular

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Balanced . . . Free Running . . . High Speed Crushing and Wheel Forming Action . . . For SHARP, CLEAN, OPEN WHEEL FACES





MODEL 1943 CC ASSEMBLY

STEEL CUTTERS For Surface Grinders, etc.

Complete Assembly $ 7.50

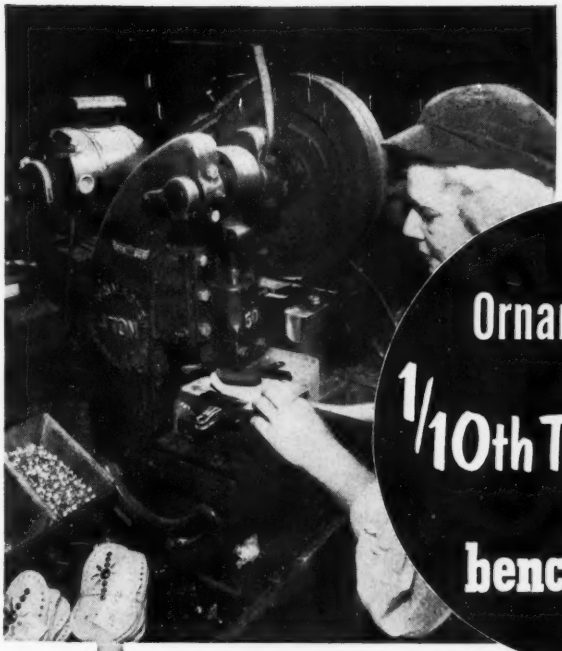
Extra Wheel $1.35

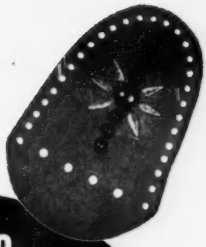
Made by the World's Largest Manufacturers of

SAW SHARPENING and KNIFE GRINDING MACHINERY

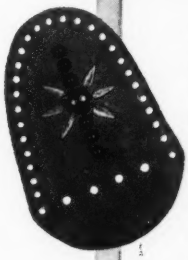
HANCHETT MANUFACTURING CO.

BIG RAPIDS, MICH. MM-112 PORTLAND 4, ORE.





Shoe Ornamentation AT 1/10th THE COST WITH benchmaster



Five years ago GUILD SHOES replaced its special machines for ornamenting leather with its first Benchmaster Punch Press. So successful was the application that 14 Benchmasters have now been installed, one for each separate die operation. *Installation of the extra Benchmasters has proved more economical than continually changing dies!* Now, two good operators working all 14 Benchmasters *supply the entire factory* with ornamental pieces! Both 1-ton and 4-ton Benchmasters are in use.

MORAL: Whatever the application, for high production at low cost, it's tough to match a Benchmaster! *Write for folder showing all models!*

benchmaster
MANUFACTURING COMPANY
1835 W. Rosecrans Ave., Gardena, California

ERRINGTON
Scores
Again!

FULLY
ADJUSTABLE
DRILLING
HEAD



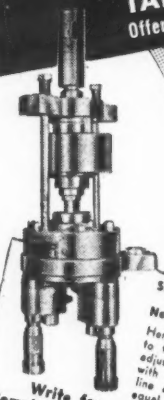
SIZES: 0 to 1/4"
3/16" to 1/2"
NO. 2 M.T Socket Capacity

Here's a light, compact tool with a wide range of adjustment. Can drill on squares, rectangles, circles, triangles and irregular patterns. Head is fully geared. Grooved ball thrust bearings on all spindles. Needle bearings wherever possible. Simple locking arrangements. All moving parts hardened. Heads made with, 3, 4 and 6 spindles.

Write for Complete Information

ERRINGTON Mechanical Laboratory, Inc.
Established 1891
Main Office and Plant STATEN ISLAND 4, NEW YORK

Only ERRINGTON
Adjustable
TAPPING HEAD
Offers So Many Advantages



- Fully geared
- Needle bearings on all spindles in head
- Ball thrust bearings throughout
- Bronze bushed
- Sand cast aluminum case
- All parts fully enclosed for pressure lubrication and protection
- Non-slip positive clamping on all adjusting members

Sizes: #0 - #10 Tap to 5/16"
#1 - 3/16" Tap to 1/2"
No. Spindles: 2 to 6

Here's a versatile tool which permits you to take advantage of a wide range of adjustment — without overhang. Supplied with 3 spindles for equal adjustment in line and 3, 4, 5 or 6 spindles for equal adjustment on bolt circles.

Write for Complete Information

ERRINGTON Mechanical Laboratory, Inc.
Established 1891
Main Office and Plant STATEN ISLAND 4, NEW YORK

workday (not exceeding 8 hours) or workweek (not exceeding 40 hours) where such premium rate is not less than one and one-half times the rates established in good faith by the contract or agreement for like work performed during such workday or workweek.

Conclusion

The foreman in a machine shop who understands the above methods of overtime compensation can help his management operate more efficiently and systematically in compiling labor costs. In addition, this useful information will aid the foreman to explain to the workers how their wages are figured under the FLSA to preclude misunderstanding. Further, if and when a government inspector should come to check the payroll records and interview the foreman as to how he computes overtime, the methods adopted above will assist in expediting any such investigation.



"Extra compensation . . . in pursuance of an applicable employment contract..."

Once the foreman in a machine shop has familiarized himself with the figuring of overtime pay under the FLSA, the less mystery it will be. The need for this knowledge is important, for inadequate overtime can prove costly to any machine shop.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.





. . No. 1 Reason for Ordering

DoALL Ground Flat Stock

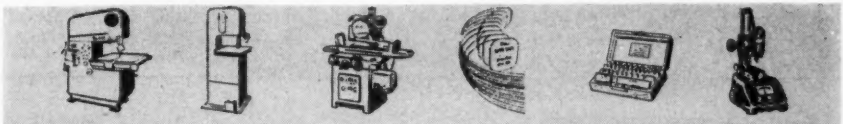
THE QUALITY of DoALL Precision Ground Flat Stock is guaranteed. Exacting control of quality starts at the melt, follows through to packaging. You'll get no complaints about hardness, surface finish, uniformity or dimensional accuracy. There are 238 sizes to best suit your plant's needs, to reduce waste and save money—in stock at 38 local DoALL Sales-Service Stores. Call DoALL today—see your classified phone directory or write:

SEND FOR SIZE AND PRICE LIST

DoALL

TS-9

The DoALL Company
254 N. Laurel Ave., Des Plaines, Ill.



CONTOUR SAWING MACHINES • SURFACE GRINDERS • GAGES • CUTTING TOOLS & INDUSTRIAL SUPPLIES

Case History No. 1 Machining Stainless Steel

By G. J. STEVENS*

PART: Welded ring 10 in. in diameter for jet engine. Made of 1 in. x 2 in. Type 321 bar stock.

OPERATION: Facing—Rough and finish to 40 micro-inches. Roughing cut—approximately 0.125 inch. Finishing cut—0.007 inch to 0.015 inch.

EQUIPMENT: Engine lathe with carbide tools (steel cutting grade).

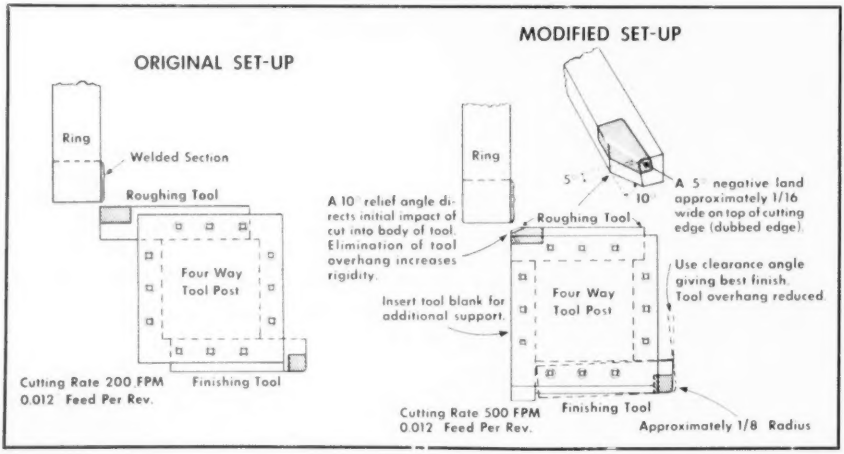
PROBLEM: Low production, poor finish, and tool breakage.

A shop with a large production order for these welded rings had estimated machining time at 30 minutes a ring. Actual time was two hours because of machining difficulties; so production was running far behind schedule. Impact at every revolution of the welded section of the ring induced early tool breakage. It was also found difficult to attain the 40 micro-inch finish specified.

HOW THE PROBLEM WAS SOLVED:

Tooling changes indicated in the drawings increased speed from 200 to 500 FPM. Roughing and finishing time was reduced to 50 seconds per cut, and finish was within the 40 micro-inches specified. Tool life was increased many times, and the original goal of 30 minutes' machining time for turning operations was achieved with time to spare.

* Machining Engineer, Armco Steel Corporation.



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KING SIZE SELECTION OF DRILL BUSHINGS

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Gives You This KING SIZE Selection!

Our new KING SIZE selection of standard types and sizes are immediately available to you through our fully stocked, exclusive Distributors – no waiting.

Our new CATALOG was produced for your convenience.

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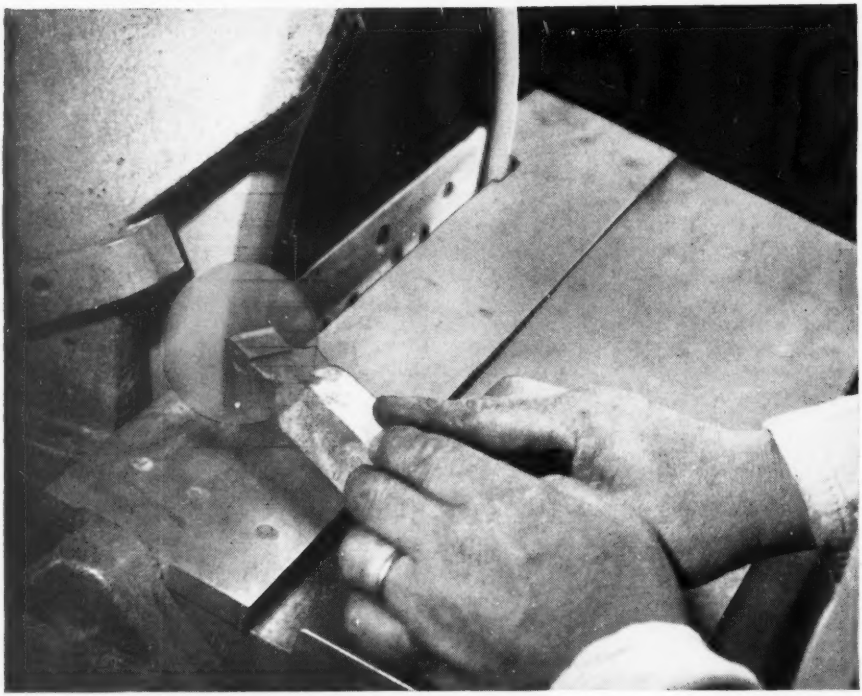
TRADE MARK

AMERICAN DRILL BUSHING CO.

5107 PACIFIC BLVD. LOS ANGELES 58, CALIFORNIA

PHONE LOgan 5-7147

SPECIALIZING ONLY IN DRILL JIG BUSHINGS



A SINGLE-POINT CARBIDE TOOL is rough ground on a CRYSTOLON wheel. A typical job where these fast-cutting, cool-cutting silicon carbide wheels are proving their worth as cost-cutters.

Add this cost-cutting "TOUCH OF GOLD" to your carbide grinding...

Save your diamond wheels with Norton CRYSTOLON* Wheels!

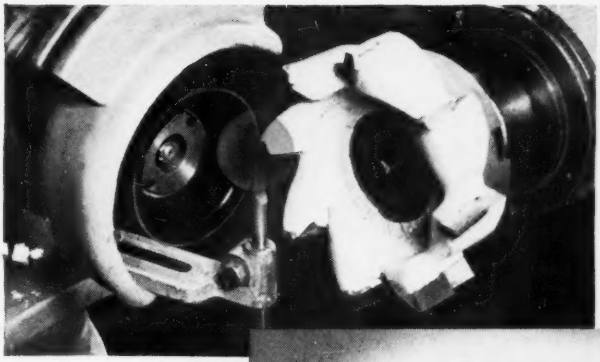
Right now, conserving your diamond wheels is not only desirable, *it is vital.*

On many carbide grinding jobs Norton CRYSTOLON (silicon carbide) wheels will give you results equally as good as diamond wheels — plus big savings. In fact, the skillful teaming of Norton CRYSTOLON wheels *with* Norton diamond wheels assures you the true, value-adding "Touch of Gold" that means carbide tools at their very best.

Where CRYSTOLON Wheels Save

In recent tests in offhand grinding of single-point carbide tools, silicon carbide wheels cost about ⅛ as much to use as diamond wheels — *per unit of carbide removed.* And a 60 grit silicon carbide wheel gave as fine a finish as a 100 grit diamond wheel!

Of course, for grinding your multipoint carbide tools and similar jobs, you'll still want Norton diamond wheels in the desired



CARBIDE TIPS ON A FACE MILL get keen cutting edges on a Norton diamond wheel — the most efficient and economical wheel for multipoint grinding.



NORTON WHEELS FOR THE "TOUCH OF GOLD" in carbide grinding include diamond wheels in three bonds — vitrified, resinoid and metal and CRYSTOLON wheels in two bonds — vitrified and resinoid in every required bond, wheel size, shape and grit size.

bonds and grit sizes. But for many other applications, especially roughing, it will pay you to switch to CRYSTOLON wheels. We make them in grit sizes up to 200, resinoid bonded or in the new vitrified K-Bond — which is quality-controlled to produce half-grade increments of hardness, enabling you to "pin-point" your exact specifications.

See Your Norton Distributor

for practical aid in selecting the most economical Norton wheels — CRYSTOLON Abrasive or diamond abrasive — for your needs. If necessary, he'll call in your Norton Abrasive Engineer for expert consultation. Backed by the world's largest manufacturers of abrasives, these Norton team-workers are ready to help you add the product-improving, money-saving "Touch of Gold" to every grinding job you do.

Get These Up-to-the-Minute Facts

The December issue of *Grits and Grinds*, the Norton monthly magazine on grinding, contains no less than three articles on carbide tool grinding by well-known Norton technicians. For valuable information on how to cut your grinding costs and improve quality, write us for your copy — also for these two helpful booklets on carbide grinding and how to make diamond wheels last longer.



NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

W-1466

NORTON

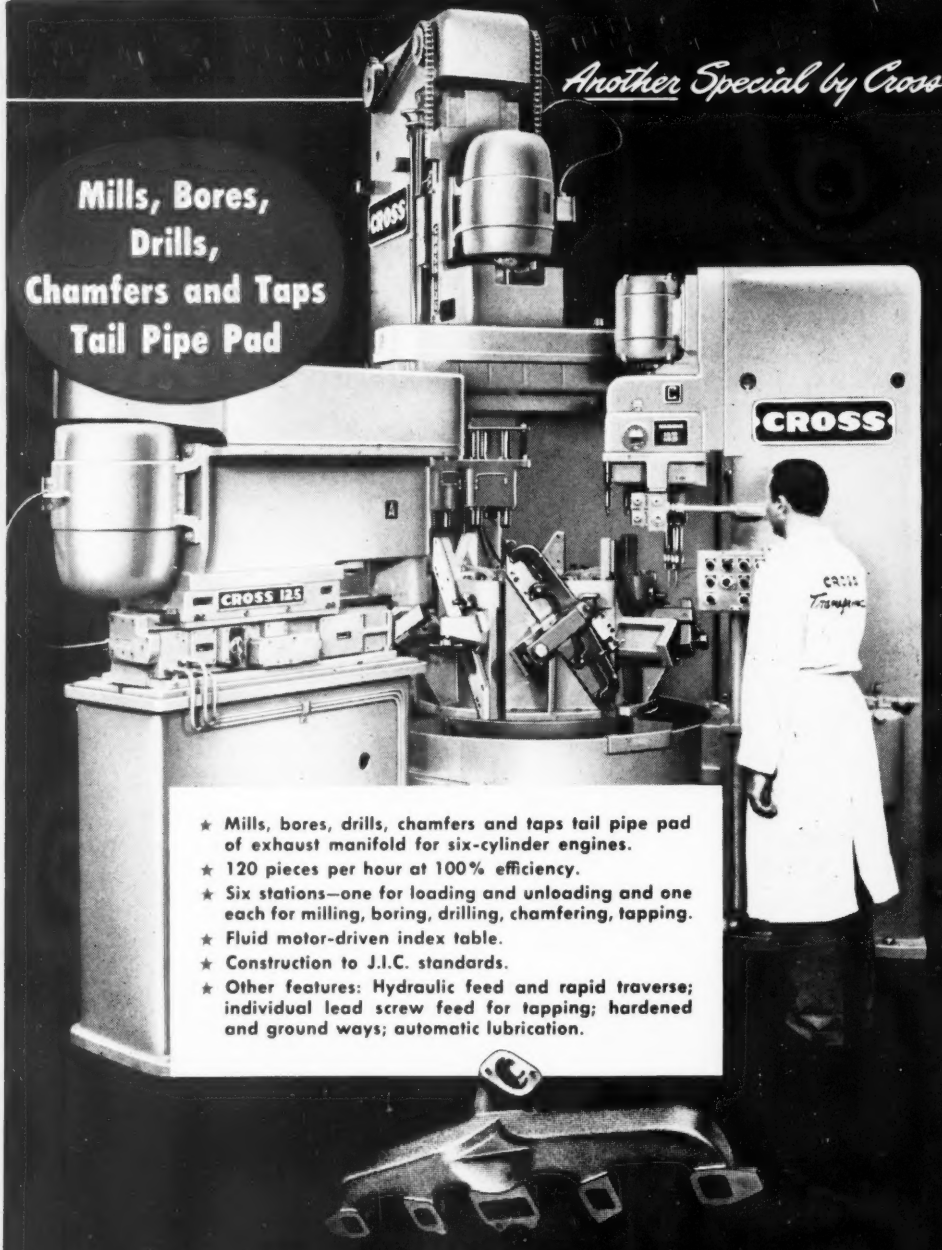
ABRASIVES

Making better products to make other products better

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

Another Special by Cross

Mills, Bores, Drills, Chamfers and Taps Tail Pipe Pad



- ★ Mills, bores, drills, chamfers and taps tail pipe pad of exhaust manifold for six-cylinder engines.
- ★ 120 pieces per hour at 100% efficiency.
- ★ Six stations—one for loading and unloading and one each for milling, boring, drilling, chamfering, tapping.
- ★ Fluid motor-driven index table.
- ★ Construction to J.I.C. standards.
- ★ Other features: Hydraulic feed and rapid traverse; individual lead screw feed for tapping; hardened and ground ways; automatic lubrication.

Established 1898

THE CROSS CO.

DETROIT 7, MICHIGAN

Special MACHINE TOOLS

Important Meeting Dates

March 17-20

American Society of Tool Engineers 21st Annual Meeting, Hotel Statler, Detroit, Michigan.

March 23-27

Eighth Western Metal Congress and Exposition sponsored by the American Society for Metals, Pan-Pacific Auditorium, Los Angeles, California.

March 31-April 2

First International Magnesium Exposition to be held in the Washington National Guard Armory, Washington, D. C., under sponsorship of the Magnesium Association.

April 13-15

Triple Industrial Supply Convention sponsored by the American Supply & Machinery Manufacturers' Association, Inc., Miami, Florida.

May 18-22

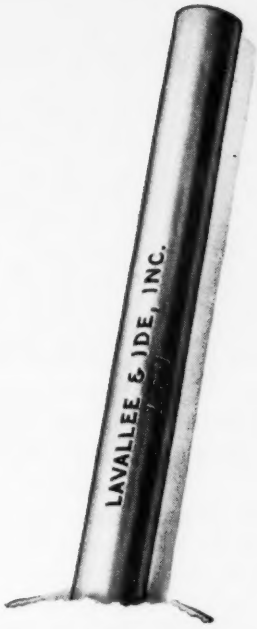
Fifth National Materials Handling Exposition sponsored by The Materials Handling Institute, Convention Hall, Philadelphia.

June 1-12

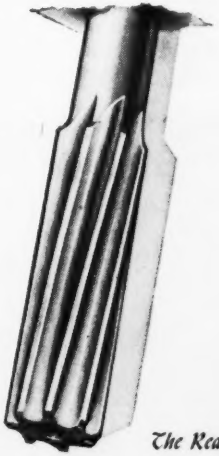
Canadian International Trade Fair, Exhibition Park, Toronto, Canada.

June 16-19

American Welding Society National Spring Technical Meeting with Welding and Allied Industry Exposition at Shamrock Hotel, Houston, Texas.



The Finest in Quality Reamers



The Reamer Specialists

LAVALLEE & IDE, INC.

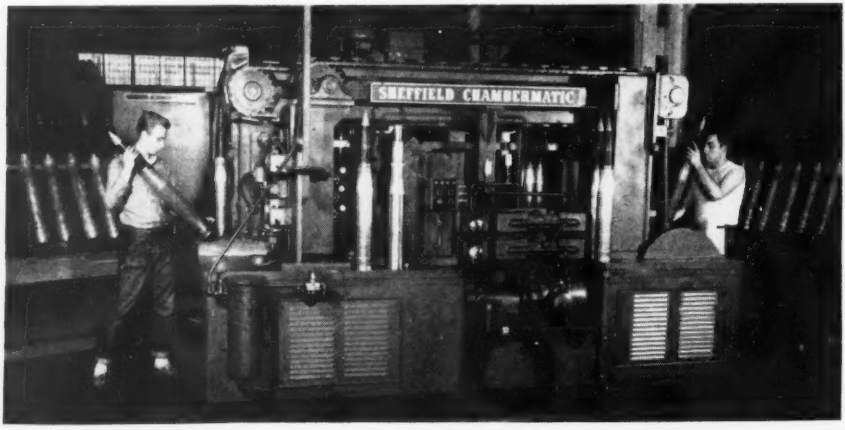
CHICOPEE, MASS.

modern equipment at work

Automatic Gage Checks Dimensions of 90 MM. Shells

THE Sheffield Corp., Dayton 1, Ohio, with the cooperation of experts from Picatinny Arsenal has designed and built what is believed to be the first automatic gage for checking the dimensions of a loaded and assembled round of 90 millimeter ammunition. This "elephant size" automatic gage, which weighs approximately 10 tons, receives the 43-lb. round measuring 3 feet in length after it has been filled with the high explosive bursting charge and the propelling powder. The round is then presented to the maximum profile and alignment chamber gage by mechanical handling. A chamber gage is similar in shape to the chamber of a gun but its dimensions are accurately controlled to within a few ten thousandths of an inch.

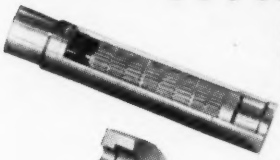
Believed to be the largest automatic gage ever built, this "elephant size" mechanized chamber gage was designed and produced by The Sheffield Corporation in cooperation with Picatinny Arsenal for use in checking the dimensions of 90 mm. shells.



THE NEW CHUCKING TOOLS

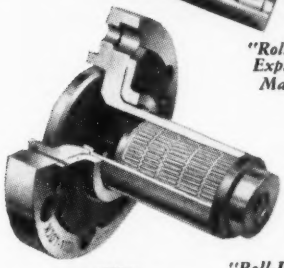
POWERFUL AND ACCURATE

. . . for precision work



SCULLY-JONES

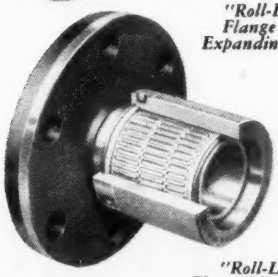
"ROLL-LOCK"* CHUCKING TOOLS



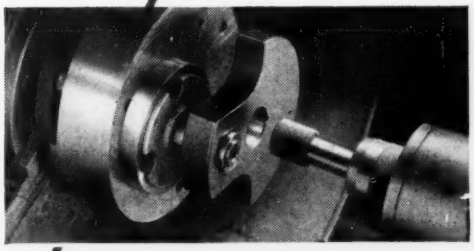
"Roll-Lock" Expanding Mandrel

"Roll-Lock" Mandrels, Arbors and Chucks use a new chucking method for holding work or tools. This method takes advantage of the elastic properties of metal.

When a very little turning force is applied to actuating ring or cone, the powerful wedging action of rollers expands or compresses the chucking surface to a shrink fit. This permits maximum torque and thrust to be transmitted, assuring accuracy often less than .0001". "Roll-Lock" Chucking Tools are engaged or disengaged quickly and easily. Yet the shrink fit cannot be loosened by reversing the rotation of the tools or by shock and vibration.



"Roll-Lock" Flange Type Expanding Arbor



"Roll-Lock" Flange Type Chuck

Shown to the right are two of the many applications in turning, grinding or inspection operations. "Roll-Lock" Flange Type Expanding Arbor and Tool Chuck being used in a finish grinding machine for holding the work and grinding tool.

**"Roll-Lock" is a trade mark of Scully-Jones and Company.*

WRITE FOR BULLETIN No. 17-50

giving detailed description and technical data on these and other "Roll-Lock" Chucking Tools.

Scully-Jones AND COMPANY

1909 S. Rockwell St., Chicago 8, Ill.

R8828MT

YOU GET LOW COST FAST ACCURATE PRODUCTION WITH OUR STANDARD AND SPECIAL TOOLS

If the assembled round fits within the chamber gage, it is acceptable and provides assurance that components manufactured in hundreds of plants throughout the United States will fit and function in the chambers of guns made by various manufacturers. Any eccentric, misaligned, or oversize rounds will be rejected by this mechanized chamber gage and, after rejection, they are mechanically segregated from the acceptable ammunition. Rounds that are accurate after passing through the chamber gage are mechanically moved out of the machine to a point where they are packed for issue to the using troops.

Guide Pin Covers Increase Average Life of Dies

AT the Stanley Home Products Plant, East Hampton, Mass., a 35-ton Multipress, equipped with a roll feed and four-station progressive dies having Elasticone guide pin covers, is used to produce mop clamps at the rate of 20,000 per day. Only casual supervision is required for this all-automatic operation.

Manufactured by the Central Safety Equipment Co., Philadelphia, Pa., the pin covers are spirally wound cones, made of specially heat-treated alloy flat steel, which are easily snapped into place over the pins and bushings of the die without the use of tools. The covers are retained in position



"HERE'S WHY I BOUGHT LUFKIN INSIDE MICROMETERS"

EASIEST TO USE—Lightweight tubular steel measuring rods are easy to handle. Rods can be added to both ends of the micrometer head, keeping head central and in balance—assuring more sensitive "feel" and precise readings. Complete line, in range from 1½ to 40 inches.

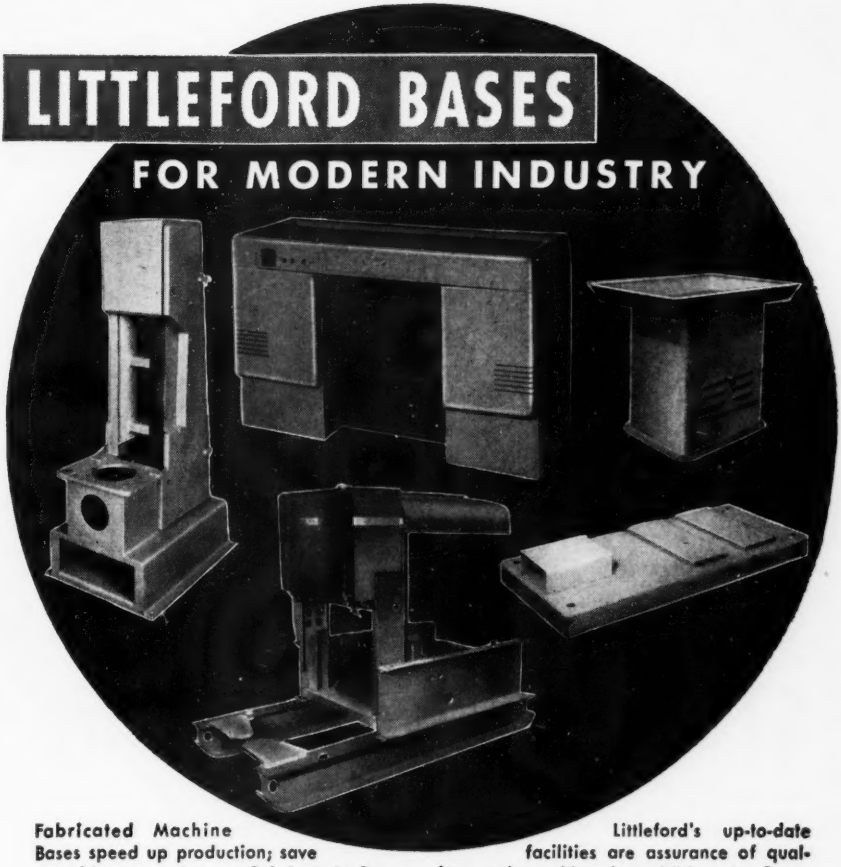
EASIEST TO READ—because of non-glare Chrome-Clad satin finish on head. Each thousandth numbered for rapid, accurate readings. More precise readings as head can be kept in line of vision when measuring rods are added.

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THE LUFKIN RULE CO., SAGINAW, MICHIGAN 211
132-138 Lafayette St., New York City · Barrie Ontario

LITTLEFORD BASES

FOR MODERN INDUSTRY



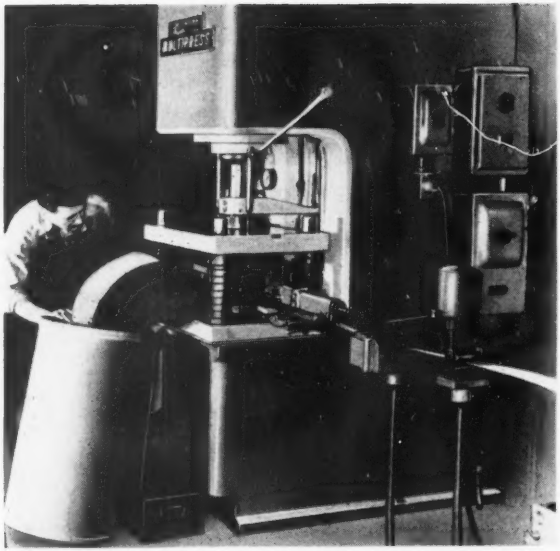
Fabricated Machine Bases speed up production; save valuable man hours. Fabricated Bases eliminate machining operations, make alterations easy without expensive pattern changes. Welded Bases are stronger and lend themselves to modern design.

Whether you need one or hundreds of Fabricated Bases, and regardless of shape, Littleford's up-to-date facilities are assurance of quality workmanship. In addition to Bases Littleford can fabricate Pans, Guards, Special Metal Parts, and Sub-assemblies to facilitate fast and accurate production. Remember there's no substitute for experience. Send blueprints today for an estimate of cost.

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LITTLEFORD BROS., INC.
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At the Stanley Home Products Plant, East Hampton, Mass., this 35-ton Multipress, using a roll feed and four-stage progressive dies equipped with Elasticone guide pin covers, produces mop clamps at the rate of 20,000 a day.

by their inherent spring tension and do not require attachment to the surface of the die being used.

The covers function simply and are self-aligning. As the press opens and closes, the covers move accordingly, their primary purpose being to eliminate the pinch point between the bushings and pins, thereby offering complete protection for the guide pins.

STOP DUSTS *Instantly*

with

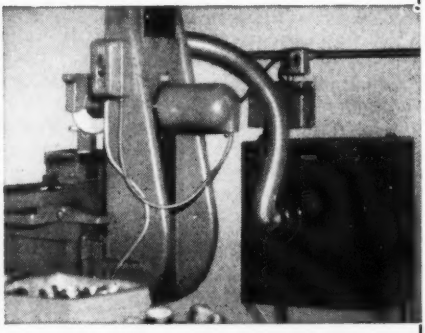
DUSTKOP

Available from stock of 22 standard models

300 cfm to 10,000 cfm

for: **Surface Grinders, Tool and Cutter Grinders; Polishers and Buffers; Abrasive Belts and Discs; Woodworking and Plastic Industry Equipment . . . DUSTKOPS collect almost all kinds of industrial dusts.**

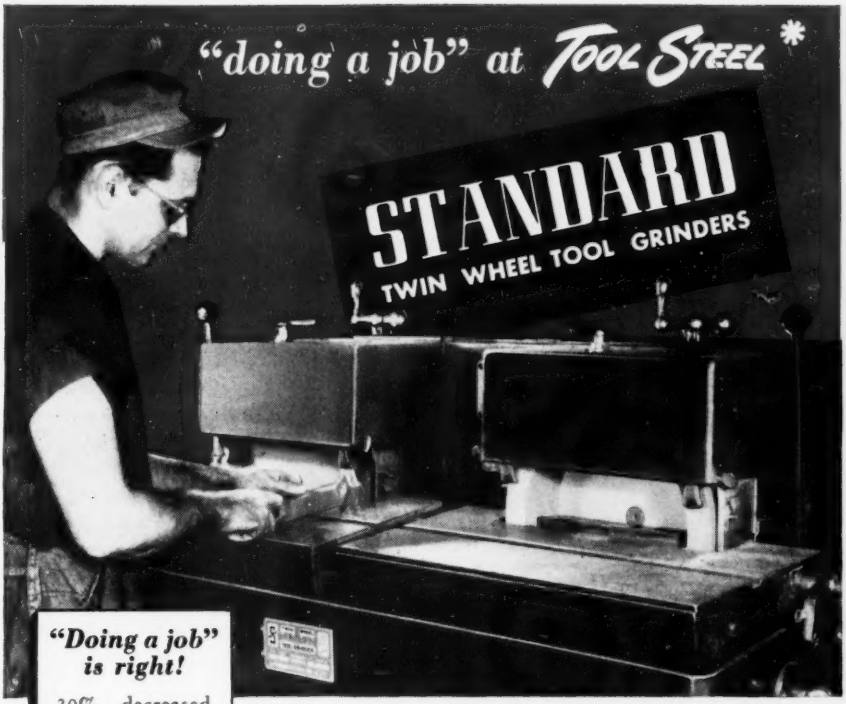
Ask for Catalog 605-2. Describe dust problem for recommendation by return mail—no obligation.



AGET-DETROIT CO.

207 Main St. Ann Arbor, Mich.

"doing a job" at TOOL STEEL *



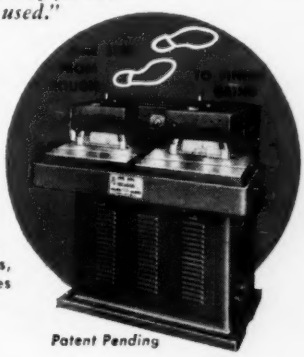
"Doing a job" is right!

30% decreased grinding time, grinding costs way down, less operator fatigue, greater wheel life, increased production.

* Here's what the Tool Room Superintendent at the Tool Steel Gear and Pinion Co., Cincinnati, Ohio says:

"Since installation this Standard Tool Grinder has had no downtime . . . required no maintenance other than routine. We use the machine daily, sometimes continuously on production wet-grinding of carbide tipped hub-turning, offset turning, boring and other high-speed steel tools. It's by far the best precision grinder we've used."

Outstanding performance? No . . . just typical of the Standard Twin Wheel Tool Grinder. Available in 10" and 14" wheel sizes; wet or dry. No spray or splash when wet-grinding. Two operators can grind at once. Conserves floor space. Write for Bulletin TW today for full details.



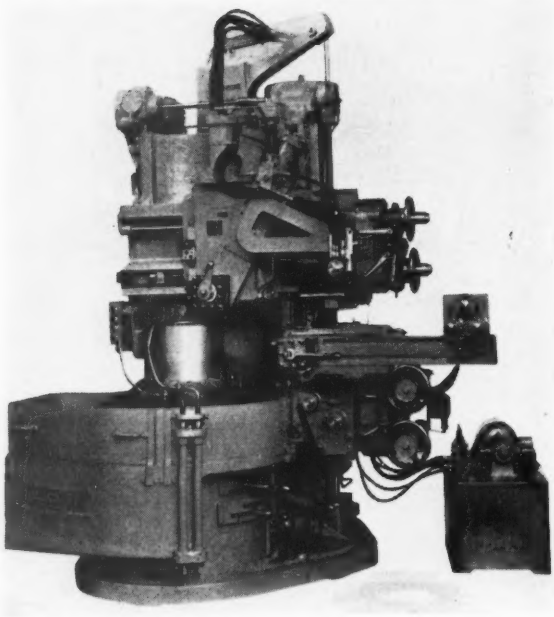
Patent Pending

standardize with . . .

See us at Booth 660, Western Metal Congress, Mar. 23-27, Los Angeles

the STANDARD electrical tool co.

2487 RIVER RD. • CINCINNATI 4 • OHIO



Niles 42/50-inch sidehead lathe equipped with Turchan hydraulic follower for use in producing jet engine parts to accuracies of plus or minus 0.001 inch

Duplicating Attachment Applied to Sidehead Lathe Increases Contouring Capacity

OF particular interest to manufacturers of jet engine parts is the setup shown in the accompanying illustration, where a vertical slide hydraulic duplicating attachment made by Turchan Follower Machine Co., Detroit 4, Mich., is applied to a 42/50-inch sidehead lathe built by Niles Tool Works, Hamilton, Ohio. This combination increases the contouring capacity of the machine, thus enabling it to perform contour operations of greater height, as well as deeper contour boring operations.

The vertical slide, powered by a hydraulic cylinder and operated from a control panel, provides infinitely variable feed rates plus rapid travel. The cutting tool is moved to produce the desired shapes on the work by means of the hydraulic cylinder controlled by the contour follower valve in contact with the template. Micrometer adjustments permit accurate positioning



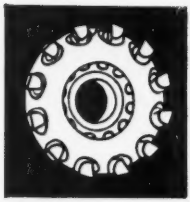
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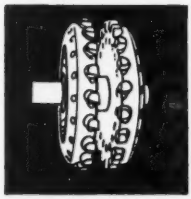
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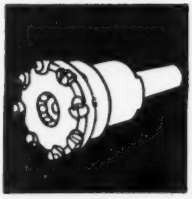
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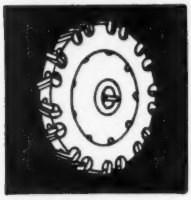
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of contours on the workpiece. The four-way turret tool block allows rough and finish cuts to be taken without altering the adjustment of the contour follower. Grooving tools can also be used in conjunction with the vertical slide, the depth of groove being controlled by adjustable positive stops on the slide. The range of parts that can be quickly produced with accuracies of plus or minus 0.001 inch include jet engine wheels, compressor discs, shroud rings, impellers, and other circular component parts.

The duplicating attachment as shown in the illustration is integral with the Niles sidehead vertical lathe; however, it can be obtained to fit other makes of standard machines.



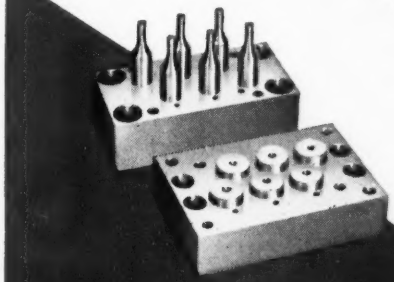
Metallizing Used to Economically Salvage Compressor Pistons

A WEST VIRGINIA machine shop has reported an interesting metallizing job involving the salvage of compressor pistons for a large chemical corporation. The piston rods are 5¼-inch alloy steel and wear 2½ feet on either side of the centrally located 19-inch pistons.

The metallizing job on the piston rods was performed in the following manner: The rods were first turned down approximately 0.100 inch on the radius, threaded with a fine U-type thread, and then prepared with a special roughing tool which produced a surface somewhat similar to knurling. The prepared surface was next sprayed with a special stainless alloy to about 3/32 inch over the original diameter and the rod ground to the re-

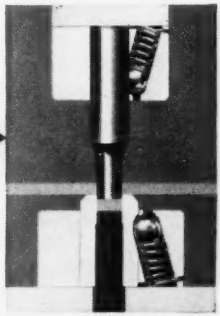


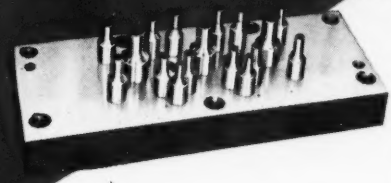
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Operator is shown spraying a compressor piston with Metcoloy No. 2 stainless using a Metco gun, both of which are products of Metallizing Engineering Co., Inc., Long Island City 1, N. Y.

quired dimension. The replacement cost for these piston rods is approximately $1,000 to $1,200 each, with delivery very uncertain. Using the metallizing process, a piston rod can be placed back in service in two days at a cost of about $250, the shop claims.

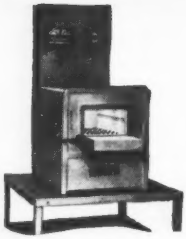
The chemical corporation for whom this work was done has found that a rod with a metallized surface has a greater useful service life than a new rod and, in addition, the packing wears longer. As a result of these advantages, the company now has new piston and rod units metallized before installation.

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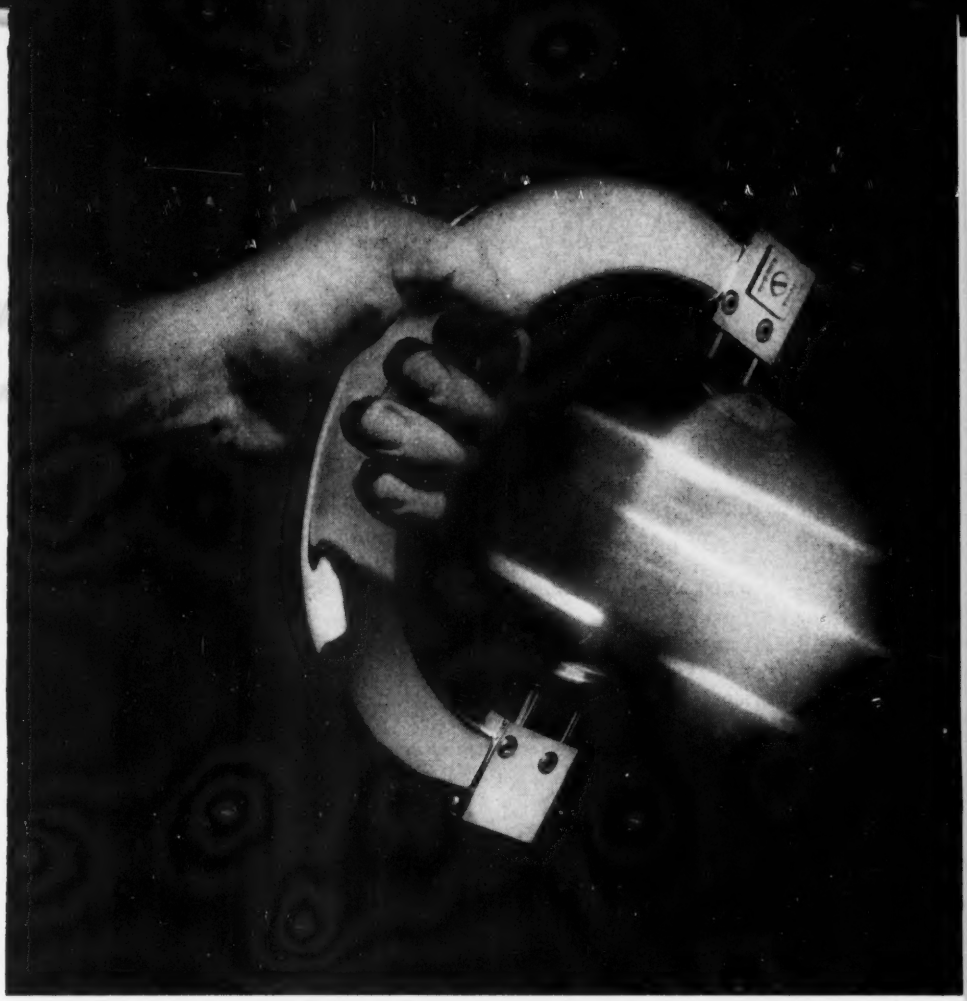
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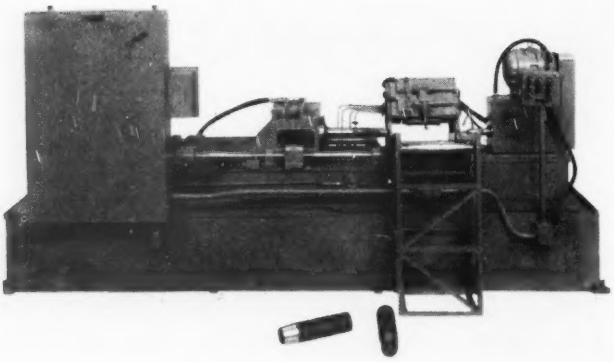
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Machine Automatically Centers 105 MM. Shells

THE accompanying illustration shows a unique shell centering machine, having automation of the shell through its entire cycle from the time the shell enters the gravity loading chute until it is ejected from the opposite side of the machine.

The machine, built by Avey Drilling Machine Co., Cincinnati 1, Ohio, for 105 mm. shells, employs a standard No. 2 Avey cam feed unit having rapid traverse, feed, and rapid return. Opposite the loading chute and cam feed unit is positioned one heavy duty expanding mandrel which traverses on

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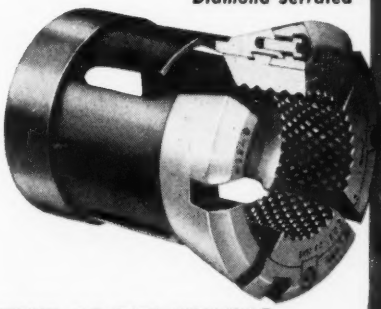
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heavy duty guide bars. After the shell has gravitated to the proper position, the expanding mandrel moves in and locates the shell, whereupon the centering unit performs its centering operation. After the centering operation is performed, the expanding mandrel moves back, and the hydraulically operated fixture allows the shell to eject from the machine onto a potential conveyor line.

Gages Inspect Root Forms on Jet Blades

TWO new gages have been developed by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn., that greatly speed the checking of external and internal pitch diameters of the root forms on jet engine blades and blade carriers. Both units are used as hand gages in conjunction with a standard P&W Air-O-Limit Model "F" Comparator. Prior to the installation of this Air-O-Limit equipment, pitch diameters of fir tree root forms were checked by hand micrometers and thread measuring wires.

The blade root gage design, as illustrated in Fig. 1, incorporates a carbide roll-type anvil which is adjustable to accommodate various sizes of root forms. The gaging point is a carbide ball point spindle which operates the single air nozzle. A carbide roll pressure shoe spans the gaging point and provides for positive location of the gage on the





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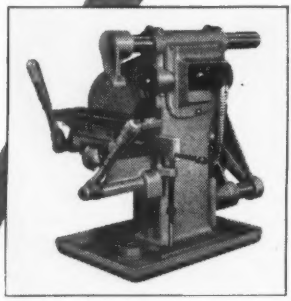
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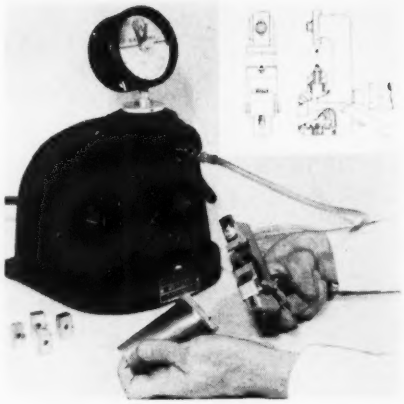


Fig. 1—Blade root gage shown with P&W Air-O-Limit Model "F" Comparator

blade root during the gaging operation.

The carrier gage, as shown in Fig. 2, is designed to check the pitch diameter of the internal root forms in the jet engine blade carrier. The design incorporates a carbide roll-type anvil and carbide gaging roll. The carbide gaging roll is on a pivot arm which operates the single air nozzle.

Fig. 2—Carrier gage shown with P&W Air-O-Limit Model "F" Comparator



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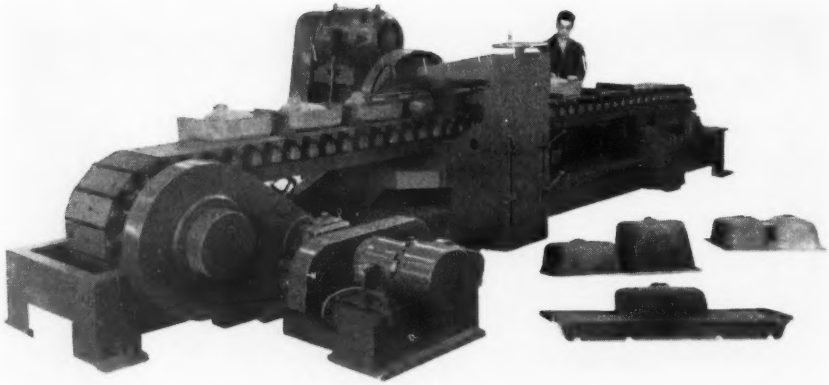
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TOGGLE clamps manufactured by Detroit Stamping Co., Detroit 3, Mich., have been adapted to a plug weld fixture for metal-folding wall

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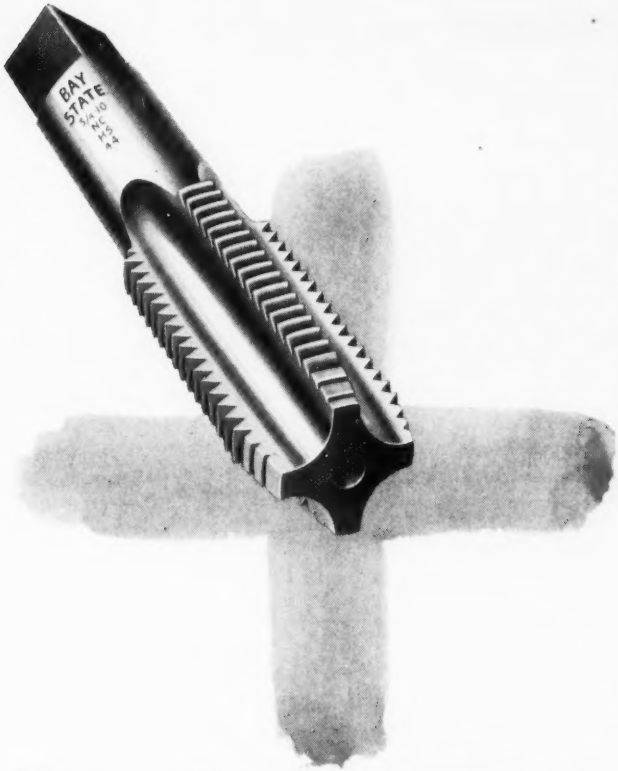
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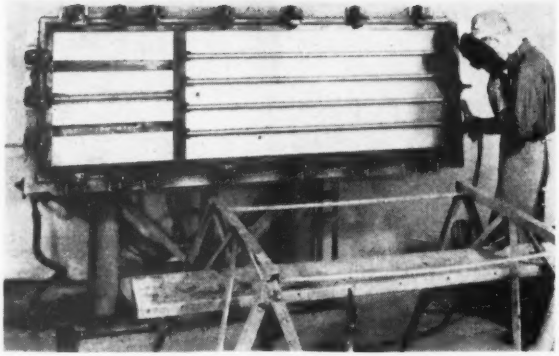
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Plug weld fixture equipped with toggle clamps is used in welding metal - folding wall tables at Schieber Manufacturing Company.

tables by the Schieber Manufacturing Company, also of Detroit. After the table top has been deburred, it is placed on the hydraulic tilting table, and the stainless band is clamped in place by the De-Sta-Co toggle clamps. By means of compressed air, the table is tilted into position for the plug-welding application. Nineteen No. 250 clamps and one No. 210 U clamp with a double-hold bar are used to obtain constant pressure in holding the stainless steel band to the table top. The clamps permit ease of insertion and removal of the steel table tops.

The Schieber "in-wall" tables and benches permit effective use of space in schools, clubs, churches, community houses, and industrial buildings. The tables are covered with heavy linoleum top surfaces.



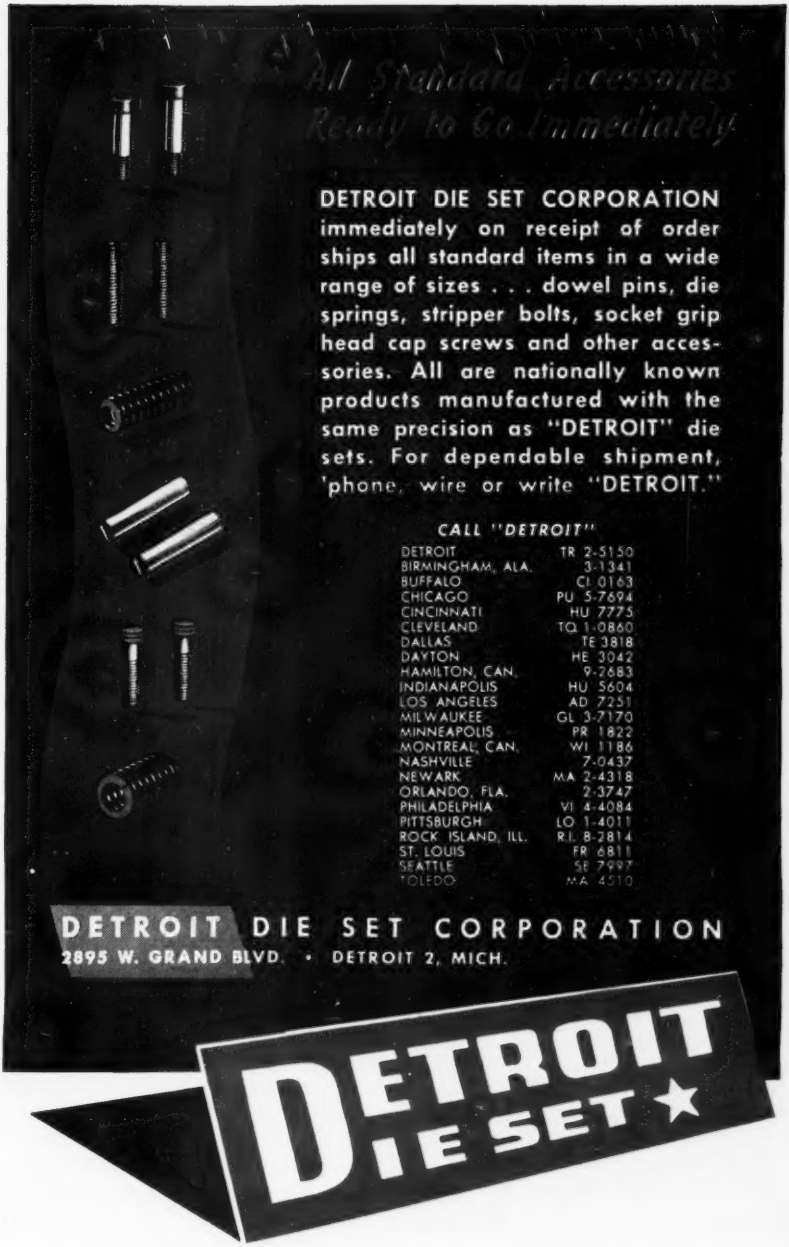
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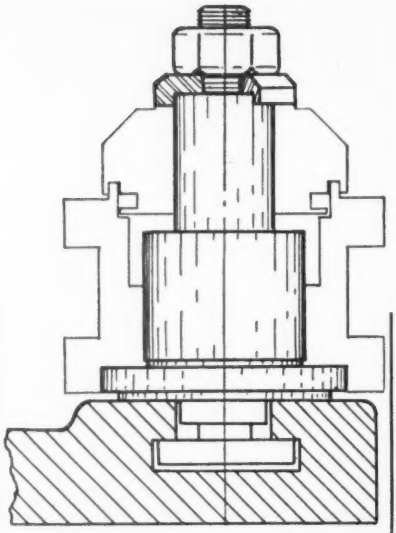
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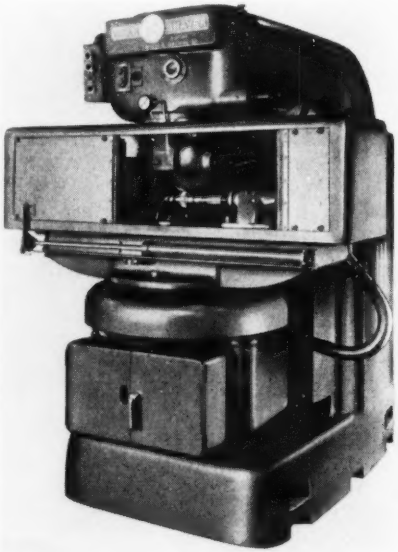
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Control Mechanism Extends Scope of Diagonal Gear Shaving

ENGINEERS of National Broach & Machine Co., Detroit 13, Mich., have developed a mechanism which, when built into a diagonal gear shaving machine, provides automatic precision up-feed in selected increments throughout the shaving cycle and automatic return to the proper backlash position for loading and unloading at the end of the cycle. This development affords the user the choice of either conventional or diagonal shaving in the same machine.



On this diagonal gear shaving machine with automatic splash guards, automatic precision up-feed in selected increments throughout the shaving cycle and automatic return to the proper backlash position for loading and unloading at the end of the cycle are provided by a control mechanism housed in a closed cabinet at the front of the knee.

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When shaving diagonally, the cycle is no longer limited to two strokes. It may now include several cutting strokes each with its own increment of up-feed and, in addition, one or more idling strokes. Cycle time, however, notwithstanding the greater number of strokes, has been decreased due to the very rapid up-feed and increased cycling speed. Increments of up-feed may be constant or varied, but each is precisely controlled. The net result is claimed to be higher gear production, greater accuracy in the product, and an increase in cutter life of up to 200 per cent.

When using conventional shaving, the operator does not have to use a handwheel to bring the work gear into shaving mesh with the cutter after loading, or to lower it out of shaving mesh for unloading. These operations are now a part of the automatic shaving cycle and as such are said to remove any possibility of serration marks on gear tooth surfaces.

On the machine illustrated, which is equipped with automatic splash guards, the shaving cycle begins with the splash guards open and the table in the proper backlash position for loading. The work gear is placed between centers and the start button pressed. The splash doors immediately close, the flow of coolant starts, the table moves upward to bring the gear and cutter into shaving position, then the cutter rotation begins, and the first shaving stroke gets under way. At the end of a prede-



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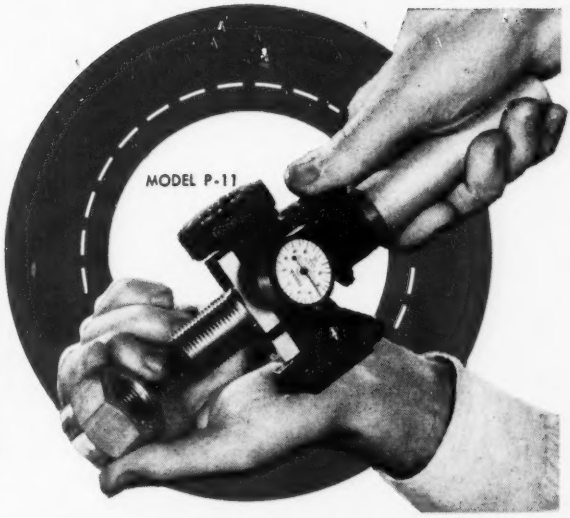
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The P-11 is a portable comparator gage. Variation from basic size of pitch diameter, form and lead are shown in a single reading on the dial indicator accurate to .0005". Interchangeable pairs of segments inspect all classes of threads in a range from 5/16" to 5" diameter.

The gage segments work on the principle of an expanding master plug. A thumb lever collapses one segment so that the part can be loaded. When the lever is released the segments engage the thread. The movement of one segment registers on a precision dial indicator which shows the accumulated amount of variation from basic size. The segments are made to the same tolerances in P. D., form and lead as a class "W" master. The segments are attached by four screws. Periodically the segments are checked to a master ring gage and the "0" setting of the indicator is adjusted accordingly. Worn segments may be returned to the factory to be reground. Dirt or cutting oil cannot affect the working parts of the gage as there are no slides or pivots. The indicator may be turned on the axis of the stem to keep the dial visible. This gage weighs only 14 oz. without the segments.

This gage is designed for use at the inspection bench or in the shop. It is used for quality control since complete control of the thread cutting process is possible. The indicator reading of variation from basic size tells exactly where within limits the work is running. For this reason also, the gage is used for checking tool wear in production jobs.

Please send descriptive literature covering the P-11 gage and other Bryant gages.

Bench type gages for external or internal threads are available, with or without squareness-of-face attachment.



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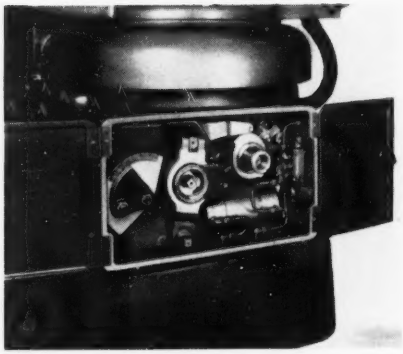
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termined number of shaving and idling strokes, cutter rotation stops, coolant is turned off, the table resumes its initial position, the splash guards open, and the shaved part is unloaded. The entire cycle is automatic. All the operator does is to unload the finished gear, replace it with an unshaved gear, and again press the start button.

The amount and accuracy of up-feed is governed by a double-sided master cam and actuated mechanically. Thus, each knee movement is fast, positive, and extremely precise. In a typical case, the knee rises approximately 0.022 inch from the backlash position for loading or unloading to bring the work gear into shaving mesh. If the feed for the initial cutting stroke is 0.002 inch, the total rise is 0.024 inch. This up-feed is said to be accomplished by differential feeding in one second.

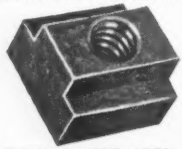
The cam is manufactured to accommodate a combination of various feeding cycles. If it is desired to reduce the number of cutting strokes, only part of the cam surface is used in service. The flexibility of the feed mechanism is such that any desired cycle may be used. Repositioning or changing the cam is a simple operation that requires only a few minutes.



Close-up view of up-feed control mechanism with doors of cabinet open

The up-feed control mechanism is housed in a closed cabinet at the front of the knee. An observation window permits the operator, at any time, to read a circular scale which indicates the amount of up-feed for each cutting stroke. The cabinet may be locked to prevent any unauthorized changes in the shaving cycle.

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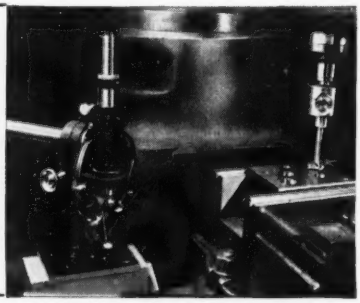
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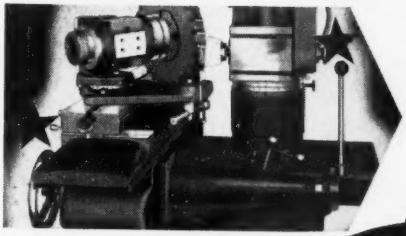
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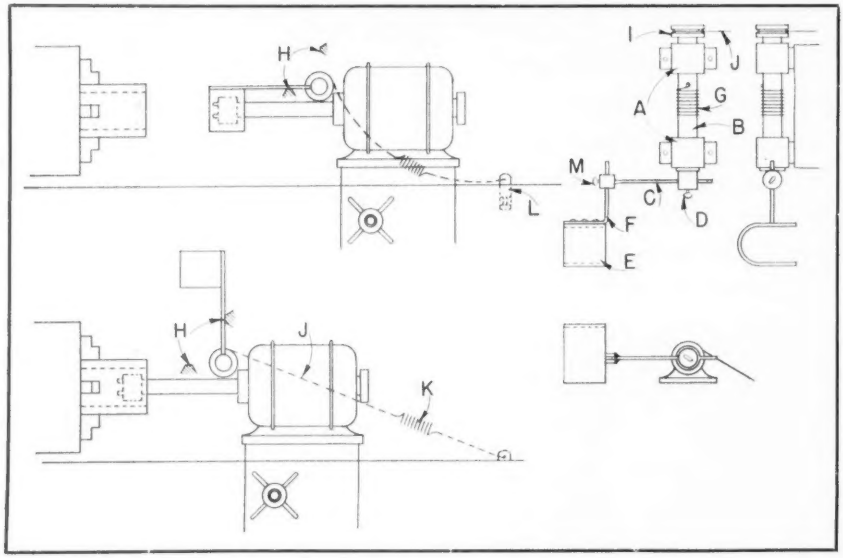
ideas from readers

Swinging Guard for Internal Grinding Attachment

By Haim Murro

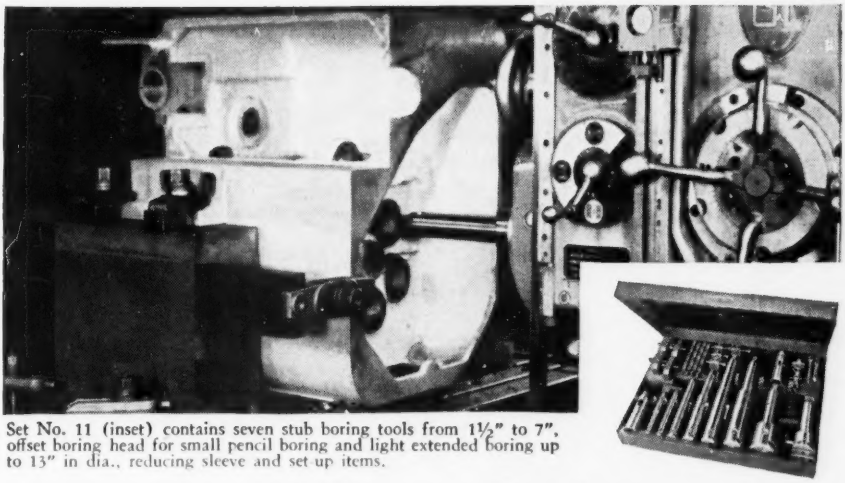
AN internal grinding attachment for the lathe usually does not have a guard over the grinding wheel to protect the operator. As a rule, the wheel is permitted to continue to rotate when it is withdrawn from the work, and the operator is exposed to the danger of injury by fragments of a cracked wheel or by accidentally touching the rotating wheel, as for example, when taking the measurement of the ground bore.

The accompanying sketch shows a



Sketch of swinging guard for internal grinding attachment

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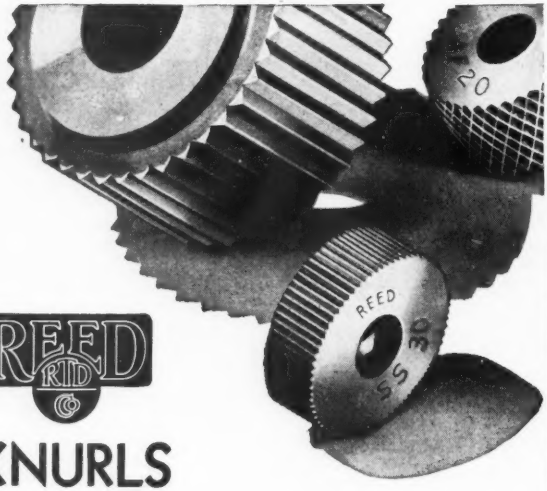
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swing guard designed by the writer for use with the wheel of an internal grinding attachment. This guard is arranged to cover the wheel when it is outside the work and swings away as the grinding wheel approaches the work. The guard remains in this position as long as the wheel is inside the bore.

Referring to the sketch, two bearings, **A**, support a shaft, **B**, which accommodates an arm, **C**, that is adjustable as to length and is held in position by a thumb screw, **D**. The guard, **E**, is riveted to a bent arm, **F**, which is adjustable on arm **C**, by means of a thumb screw, **M**. The shaft **B** has a torsional spring, **G**, wound around it. Two stops, **H**, fastened in convenient locations, limit the swing of the arm **C** to both sides. A grooved roller, **I**, is fastened to the other end of the shaft **B**, and a flexible cable, **J**, is attached to the periphery of the roller and wound around it once. The opposite end of the cable **J** is connected, by means of a tension spring, **K**, to a hook, **L**, the position of which can be adjusted along the bed of the lathe. When correctly set, the cable is tensioned just before the grinding wheel enters the work. As the carriage moves closer to the work, the cable unwinds off the roller **I**, thus rotating the shaft **B** and swinging the guard **E** away from the grinding wheel and clear of the work. To facilitate this action, the torsional



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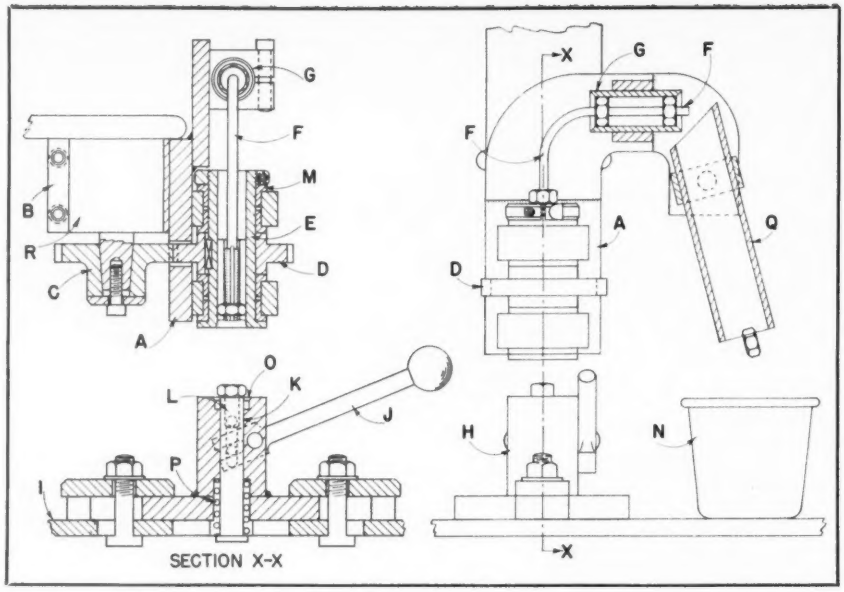
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THIS NEW CATALOG...



gives you complete information and specifications on the STERLING Model "G" grinder. Just drop us a post card for your free copy.



Sketch of attachment for use in the continuous tapping of nuts on a standard sensitive drill press

spring **G** should be lighter than the tension spring **K**. As the grinding wheel is fed deeper into the work, the tension spring stretches. When the grinding wheel is retracted, the cable hangs loosely and the spring **G** causes the guard **E** to be swung back to guarding position.

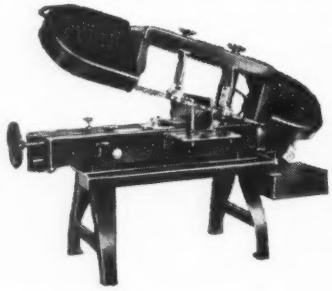
Continuous Nut Tapping on a Drill Press

By F. E. Riley

A LARGE quantity of small hexagon nuts with metric threads were required by a small shop which, because of the odd number of nuts re-

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Blade Size 3/4"x.032x11'6"
Floor Space 20"x66"
Blade Travel 60, 90 and 120 ft. per minute
Swivel Vise 45 degrees in either direction
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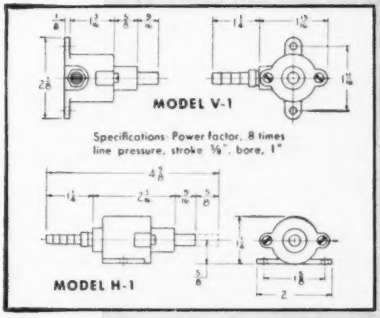
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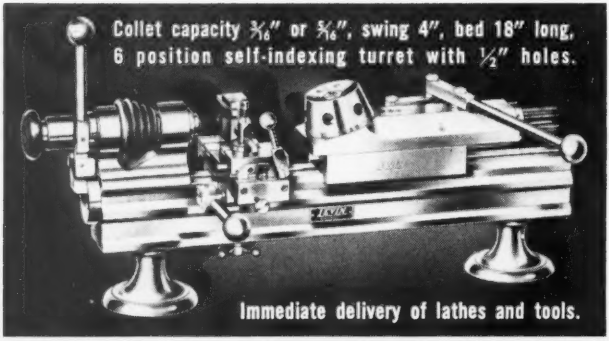
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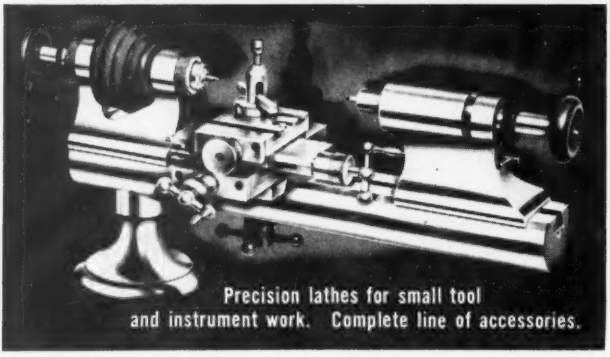
quired at irregular intervals and also because of the fact that large single orders for the nuts could not be placed, found that it was uneconomical to order the nuts from a nut manufacturer. The shop was equipped to produce nut blanks at a rather economical rate and thus it was only necessary to provide some means of threading the nuts at high speed.

After some experimenting, a continuous nut tapping method was devised which employs a bent-shank tap that is held stationary while the nuts are revolved and travel along the bent shank and finally fall off the end into a hopper. The tap shank is filled with a series of nuts, and the tap is prevented from turning and also located in place by the series of nuts which encase the bent end of the tap and slide through a tube whose axis is at right angles to the threaded portion of the tap. An attachment was designed which enabled the nuts to be tapped continuously on a standard sensitive drill press.

Referring to the accompanying sketch, the attachment comprises a welded base plate, **A**, which is provided with a clamp, **B**, for fastening it to the drill press spindle sleeve, **R**. The regular chuck is removed from the machine spindle and is replaced by a spur gear, **C**, which is bored out to a taper to fit the spindle and is held in place by means of a washer and a locking screw. The spur gear meshes with



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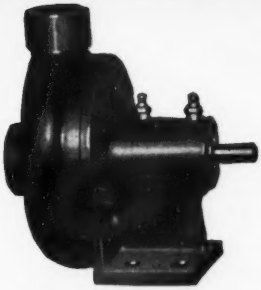
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MODEL AOL

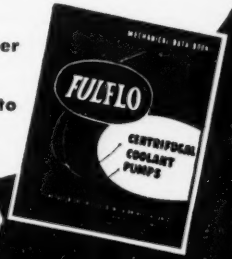
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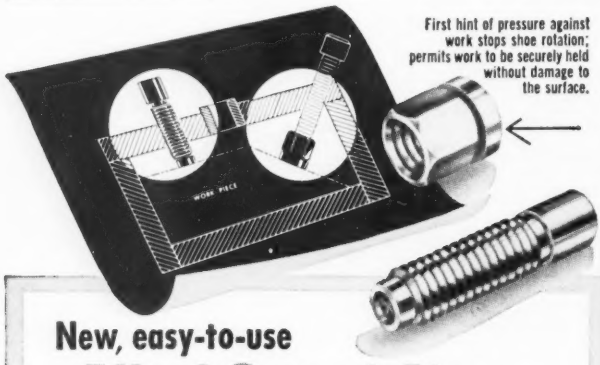
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THE FULFLO SPECIALTIES CO. Inc.

BLANCHESTER, OHIO

a second gear, **D**, through a slot cut in the base plate, **A**, and is keyed to the outside of a sleeve, **E**, which rotates in plain bearings, **M**, the housings of which are fastened to the base plate. The sleeve interior is of hexagonal section for the lower half of its length so that the nuts are rotated by it but can slide vertically as they thread their way up the stationary tap, **F**. The upper half of the sleeve interior is bored out to a diameter equal to the nut distance across corners so that the nuts cease rotating when they leave the top of the tap thread.

When the attachment is in use, three or four nuts are threaded onto the bent shank of the tap where it passes through the horizontal supporting tube, **G**, and one or two nuts are dropped into the upper portion of the revolving sleeve, **E**. These nuts engage rather closely the tap shank and support it radially and longitudinally. Drilled nut blanks are picked up by the operator's left hand, one at a time, and are dropped into a recess, **O**, in the feeding device, **H**, bolted to the drill press table, **I**. The feed handle, **J**, is pushed down by the operator's right hand, thereby causing a nut to be moved upward to the mouth of the rotating sleeve, **E**. Light pressure on the feed handle provides for engagement of the hexagon exterior of the nut with the internal hexagon surface of the revolving sleeve which tends to thread the



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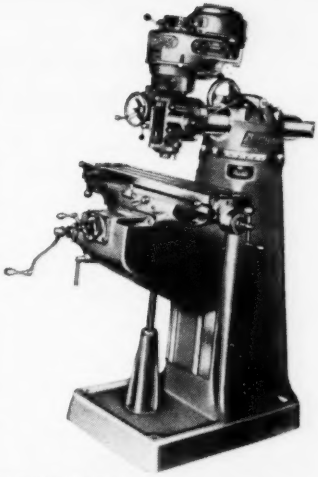
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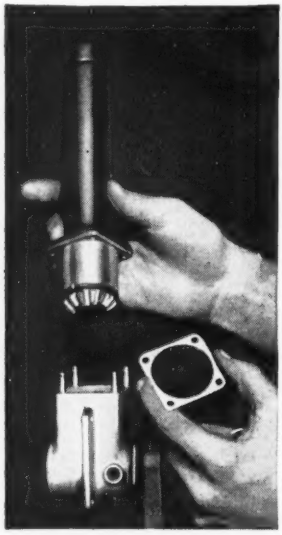
nut onto the stationary tap. The nut is followed upward by the ram, **K**, of the feeding device so as to afford an accurate start to the nut and to prevent it canting out of square. The feeding pressure imparted to the nut by the ram also aids the tap in starting a sound thread and eliminates the necessity of the tap having to push the nut through the rotating sleeve until a full thread is formed. The end of the tap can pass into the rising ram through an axial hole, **L**, bored therein.

After each nut is started on its way, the ram lowers itself under the action of the return spring, **P**, and a second nut is dropped into the recess of the feeding device. By the time the second nut has been started on the tap, the preceding nut has passed the top of the tap threads and awaits the arrival of the second nut which will push it further up the tap shank. The loading of the feeding device by the operator allows sufficient time for the tap to finish a nut so that only one nut at a time is engaging the tap threads. Eventually, the tap shank becomes encased completely in nuts and, when full, the topmost nut is pushed off and drops into a length of large-bore tube, **Q**, which directs it to a hopper, **N**.

The nut threading attachment is said to tap nuts of 6 mm. thread diameter at a rate of 30 nuts per minute. It can also be used for other nut sizes having similar hexagons.

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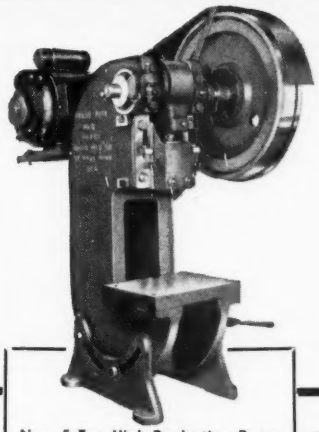
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Bending Die of Unusual Design

By Federico Strasser

THE natural direction of movement of the ordinary press is vertical; consequently, dies are usually designed so that they utilize the downward stroke of the press for the active part of the operations performed. Nevertheless, there are cases where it is necessary to use a die having horizontally moving components such as required in forming a workpiece of the type shown in Fig. 1. In these cases, the transformation of the vertical movement of the press ram into horizontal movement of the die components is generally effected by proper combinations of inclined planes; however, this type of construction is usually expensive and, as a rule, usually requires a type of press which has a comparatively long stroke.

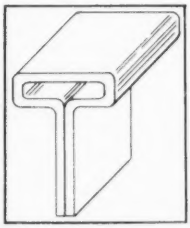


Fig. 1—Sketch of part formed with bending die shown in Fig. 2

A solution to the problem is afforded by the design of die shown in the illustration Fig. 2, which utilizes pivoted bent levers that effectively transform the vertical



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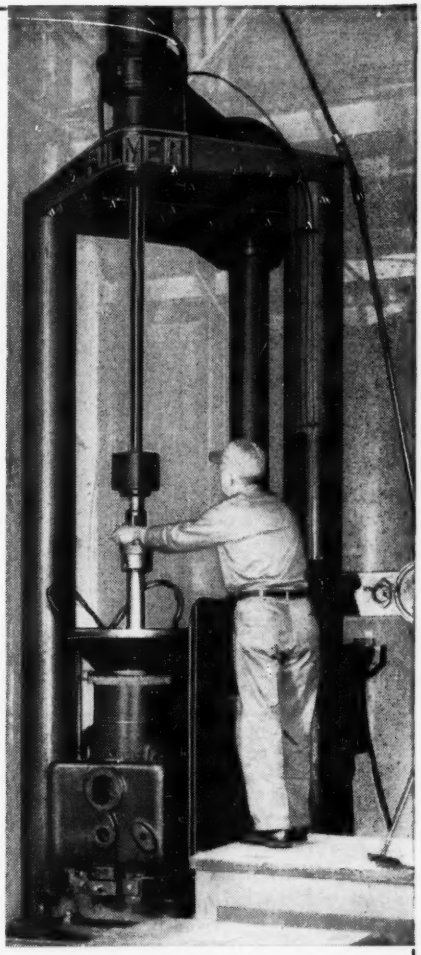


Photo taken in Continental Gin Co., Birmingham, Ala. honing Diesel cylinders.

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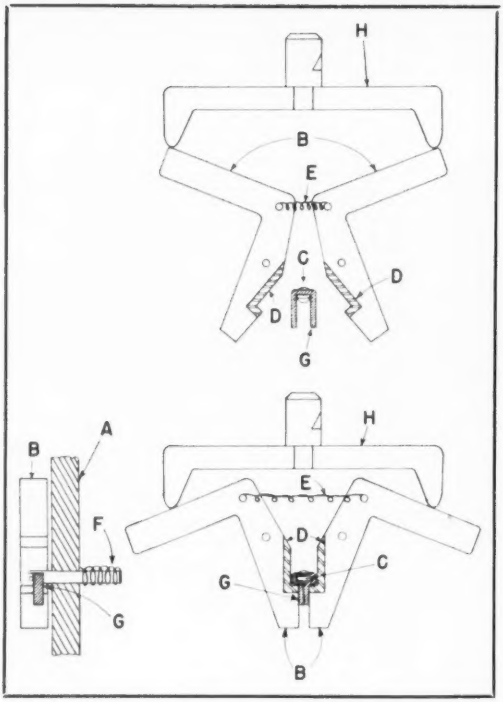


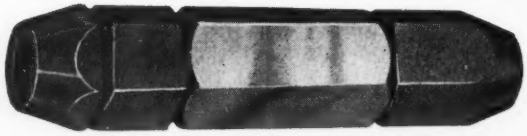
Fig. 2—Sketch of bending die utilizing pivoted levers to convert vertical ram movement into horizontal actuation of die components

ram movement, through arc movement, into a horizontal die action. The die consists essentially of a vertical base, **A**, carrying a pair of pivoted levers, **B**, and a core, **C**. The levers are made from cold rolled machinery steel and provided with hardened tool steel inserts, **D**. Symmetrically disposed on either side of the center line, the levers are held in open position by means of a spring, **E**. The core **C** is made from hardened drill rod and is held in place by means of a spring, **F**. The core is provided with a slot in the end for accommodating the workpiece, **G**, and is machined on the exterior to a shape corresponding to the inner shape of the finished workpiece.

In operation, the workpiece, preformed to U-shape, is placed in the slot of the core **C** and the press ram with U-arm, **H**, attached thereto is made to descend. As the U-arm contacts the levers **B**, they are actuated so as to close the legs of the U-shaped workpiece against the core **C** and thus form the workpiece to the desired design. As the ram ascends, the core, attached to a knockout bar, is pushed forward so that the completed workpiece can be easily removed from the core.

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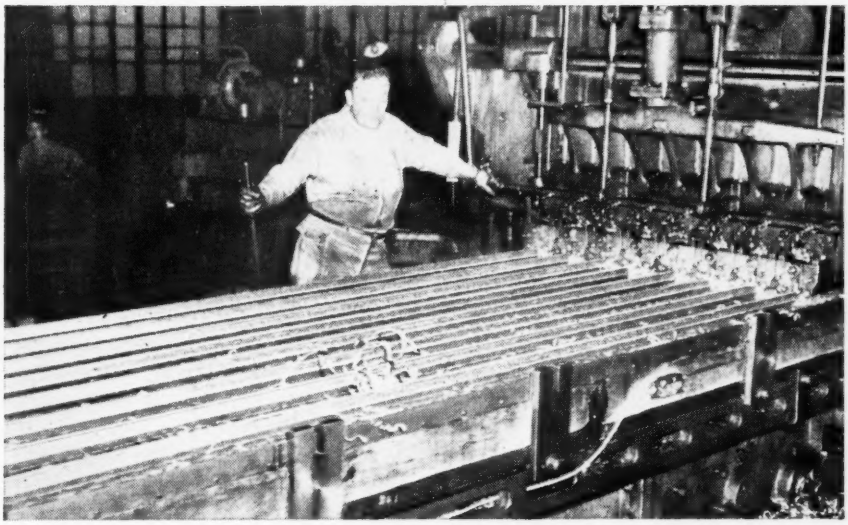


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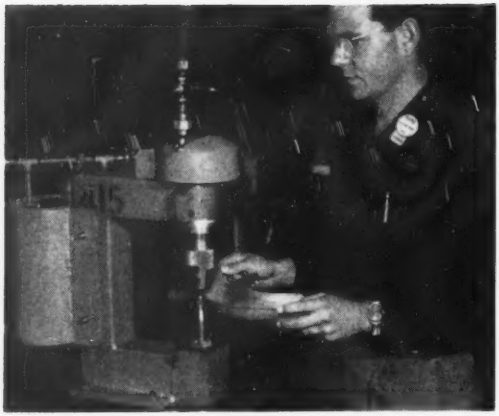
Solution: Walker engineers recommended a chuck installation 60" x 198" with *balanced magnetic circuit* essential to proper chip control. The holding power of this installation is more than 200 psi.

Result: Set-up simplified . . . danger of distortion minimized . . . *two men* now doing a planing job which formerly required *three* . . . production time per piece cut in half . . . work pieces have better and closer tolerances. Neither tools nor rails are magnetized.

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Flanges of formed half duct are trimmed for welding by Northrop Aircraft worker with a special holding rack having a router motor.

Router Trims Parts for Welding

By Gilbert C. Close

BY adapting an Onsrud router motor to a special holding rack as shown in the accompanying illustration, employees at Northrop Aircraft, Inc., Hawthorne, Calif., have introduced a shop operation that trims the flanges of formed half ducts to exactly ⅛ inch in preparation for welding. Before using this new setup, it was necessary to scribe the parts to a trim template and then saw, trim, and hand-file to the required dimensions.

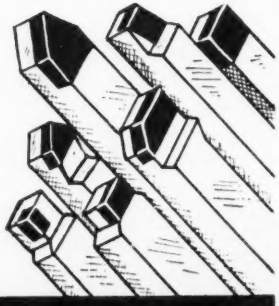
Designed by Art Dietrich, a leadman in Northrop's welding shop, the machine can finish-trim 120 inches of duct a minute. With the old saw-and-file method, trim averaged about 2 inches a minute. An air hose attachment

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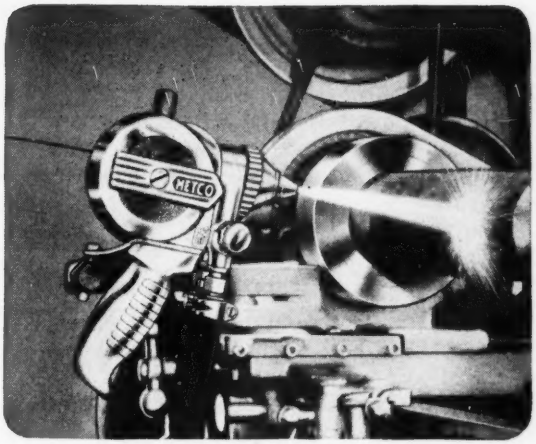
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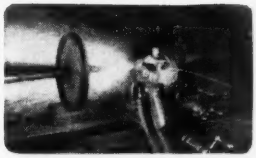


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Free Bulletin or Shop Demonstration—Send off the coupon for the detailed information Bulletin 55 gives you. Or, better still, ask for a demonstration in your own shop by a Metco Field Engineer. He'll be glad to show you how the new Metco L-Gun works on some job of your own. No obligation, of course.



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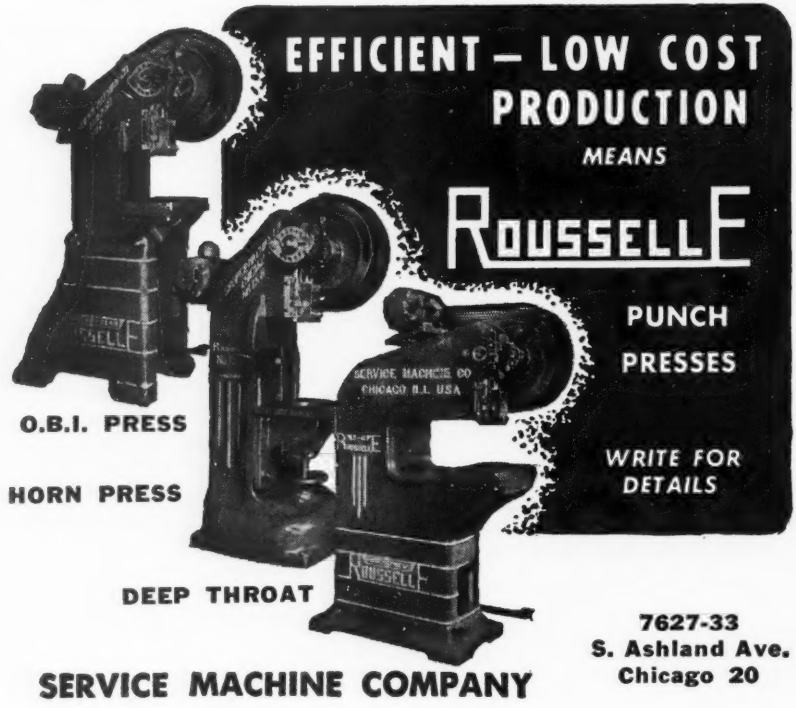
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blows the chips away as the half ducts are trimmed. Simultaneously, a regulator blows oil on the cutter. The router motor operates at a speed of 38,000 revolutions per minute.

Standards for Training Machine Tool Draftsmen. Published by National Machine Tool Builders' Association, 10525 Carnegie Ave., Cleveland 6, Ohio. 11 pages. Plastic binding, heavy paper covers. Price, $1.50.

This report is presented as a supplement to the association's report on "Apprentice Training Standards for Machinists" which was issued in 1949. It includes a summary of standards for training machine tool draftsmen and suggested forms of application for apprenticeship, apprenticeship agreement, conditions of apprenticeship, and quarterly apprenticeship report. The booklet also contains a facsimile of a certificate issued upon completion of an accredited apprenticeship.

For further information on any product mentioned in this issue—use the READER SERVICE CARD between the covers.



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news of the industry

Annual Meeting Held by Cleveland Punch Quarter Century Club

The Quarter Century Club of the Cleveland Punch & Shear Works Co., 3917 St. Clair, Cleveland 14, Ohio, held its annual meeting recently in the Embassy Room of the Hotel Carter. The meeting was attended by 46 employees having a total of 1,429 years of service. Mrs. Florence Sayle, company president, presented gold watches to 15 men having 30 to 35 years of service. The recipients of the watches were M. Thomas, C. Richmond, S. James, J. Pitts, J. Berry, F. Jonke, R. Howell, W. Stewart, J. Yonke, F. Novak, A. Fitzgerald, G. Kelly, S. Novak, A. Tiascik, and J. Roth.

Five new members, attired in caps and gowns, were welcomed into the club in a simulated graduation ceremony. These men, F. Bey, S. Kusmer,



Members of the Quarter Century Club of The Cleveland Punch & Shear Works Company

W. Kromer, J. Jaklitsch, and A. Skodis, were greeted by Mrs. Sayle and presented with small tool kits.

Practical Lubrication Seminar

A helpful seminar on industrial lubrication engineering, sponsored by the Philadelphia section of the American Society of Lubrication Engineers, is scheduled to begin Tuesday evening, February 10, 1953, at Philadelphia's Bellevue-Stratford Hotel. The educational course will continue for four more consecutive Tuesdays, ending on March 10, and will include detailed explanations and instructions on such subjects as lubricant dispensing equipment, planning and installing complete lubrication maintenance programs, theory and application of drawing compounds and cutting oils.

The closing meeting will feature a panel discussion session in which experts will answer any unusual lubrication application problems. Certificates of attendance and bound copies of instruction data will be presented to those attending the seminar. A nominal fee will be charged for registration. Further information may be obtained by writing C. R. Schmitt, E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pennsylvania.

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Chicago tool engineers touring Clearing Machine Corporation plant

Clearing Machine Host to Chicago Tool Engineers

Clearing Machine Corp., Chicago, Ill., recently held an open house for the local members of the American Society of Tool Engineers. Plant visits were scheduled in the afternoon and evening. Of special interest to the tool engineers were the machining operations performed on heavy press components. A giant horizontal bar mill was particularly noted by the visitors. This floor-type mill required a foundation 11 feet deep for its support.

The trip ended with a visit to Clearing's engineering building where the visitors were gathered for a discussion of the company's manufacturing methods and engineering problems.

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Morey Announces Changes in Management

At a recent meeting of the board of directors of Morey Machinery Co., Inc., 410 Broome St., New York 13, N. Y., several changes in management were made. S. M. Morey was named chairman of the board, and Leonard Morey was made president. Robert Morey was elected vice president and secretary, and D. T. Himoff was appointed vice president. Samuel Morey is now treasurer of the firm.



S. M. Morey (left) and Leonard Morey

Morey Machinery has a background of over 40 years in the manufacturing, merchandising, and distributing of machine tools.



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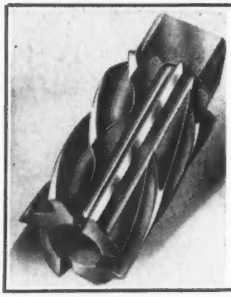
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Van Norman Founder Celebrates 90th Birthday

More than 200 industrialists, businessmen, bankers, civic leaders, and professional men honored Frederick Dewey Van Norman, chairman of the board and a founder of Van Norman Company, at a luncheon held recently in the Hotel Sheraton, Springfield, Mass., marking Mr. Van Norman's 90th birthday. Also present to honor the city's oldest active industrialist were members of the management and



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executive groups of the internationally-known automotive service equipment and machine tool manufacturing company, representing the firm's 1,600 employees.

James Y. Scott, company president, was toastmaster, and brief talks were presented by Mayor Daniel B. Brunton, Works Manager Edward G. Brogan, and Henry A. Field, a senior director of the firm.

Arthur S. Armstrong Elected President of Cleveland Twist Drill Company

Arthur S. Armstrong has been elected president of The Cleveland Twist Drill Co., Cleveland 14, Ohio, succeeding Jacob D. Cox who has been named chairman of the board. Mr. Armstrong has been with the company 20 years. After spending several years in the factory, he became a service representative, and later was transferred to the administrative department. In 1949



Arthur S. Armstrong

he was made executive vice president.

Mr. Cox, now chairman of the board, was president for a period of 33 years. In his new position as chairman of the board, he will continue to take an active part in the overall affairs of the company.

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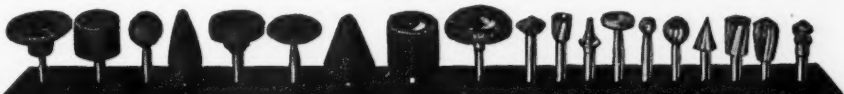
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Dremel Moto-Tools are time tested—have been widely used in industry for over fifteen years. A veteran of World War II, Moto-Tool served in war plants and at military maintenance bases throughout the world. Thousands of these mighty midgets helped to make the atomic bomb—were used to establish production records in defense industries during the last war. Hundreds of toolroom and production line operations, such as polishing and grinding dies, burring parts, marking tools, sharpening cutters, touch up jobs, etc. are accomplished in seconds, *without tearing down "set-ups."* Moto-Tool is sturdily constructed for long lasting industrial service. Weighs only 13 oz.—dynamically balanced for vibrationless operation.

MOTO-TOOL KIT NO. 2 contains 23 accessories, including ***high-speed steel*** cutters and Model 2 Moto-Tool in natural finish hardwood case **$23.50**

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Dremel HIGH-SPEED STEEL CUTTERS and balanced wheel points are available for all makes of hand grinding tools. Write for literature.



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Firm Organized to Manufacture Sheet Steel Separators

The Basco Manufacturing Company, with offices located at 5 Woodside St., Stamford, Conn., has been formed for the purpose of manufacturing Basco Sheet Steel Separators, formerly marketed by D. C. Canfield, New Britain, Connecticut.

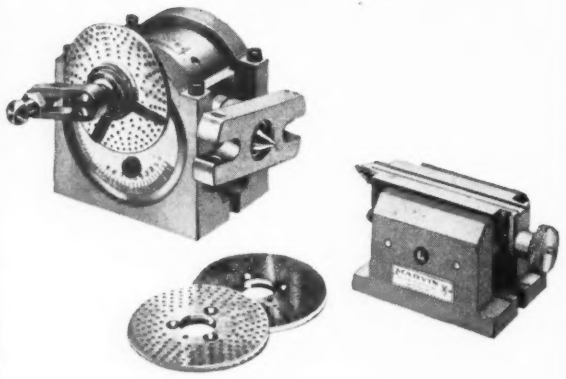
The separators are magnetic units that permit automatic separation of stacked sheet metal. At present, the firm is making four sizes, ranging from 6½ to 13 inches in height. The capacities of the units will range from 20 gauge 12 inches wide to 10 gauge 24 inches wide.

Guy J. Coffey Elected President of Chicago Pneumatic

At a recent meeting of the board of directors of Chicago Pneumatic Tool Co., New York 17, N. Y., Guy J. Coffey, vice president, was elected president to succeed the late W. L. Lewis. H. A. Jackson, chairman of the board, has been acting president since Mr. Lewis' death and will continue as chairman and chief executive officer. Also elected at the meeting were Thomas P. Harris and James F. Huvane as vice presidents.

Mr. Coffey has been associated with Chicago Pneumatic since 1933. In 1939, he was appointed manager of the Los Angeles sales district and was elected vice president in charge of sales and a director of the company in 1945.

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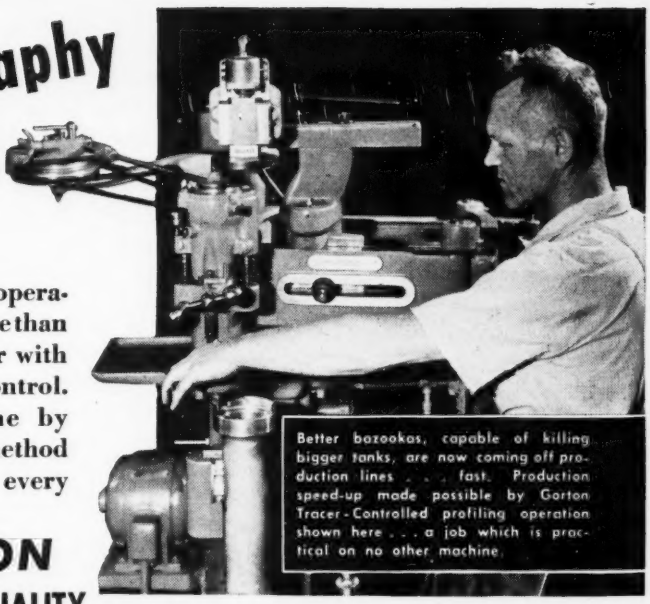
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Pantography at Work

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Inside profiling operation produces more than 36 pieces per hour with Gorton Tracer Control. Approximate time by the next best method . . . one piece every two hours.



Better bazookas, capable of killing bigger tanks, are now coming off production lines . . . fast. Production speed-up made possible by Gorton Tracer-Controlled profiling operation shown here . . . a job which is practical on no other machine.

GORTON

• IMPROVES QUALITY
• INCREASES PRODUCTION • CUTS COSTS

On many all-but-impossible jobs, Gorton Tracer-Controlled Pantographs and Duplicators speed up production on military or industrial contracts. High surface finish results from spindle speeds up to 45,000 R.P.M. Accuracy results from the use of over-size masters, patterns, or templates together with the reduction ratio which is exclusively characteristic of the pantograph. Whether a dozen or a thousand pieces, each is identical to the first. Work piece size varies from instrument parts to areas of 10 to 20 feet.

Gorton tracer-controlled equipment quickly pays for itself in profiling, routing, die sinking, mold cutting, counterboring, chamfering, grooving, graduating, engraving as well as many other standard or special operations on ferrous or non-ferrous metals and plastics where work is flat, uniformly curved, cylindrical, spherical or irregular in shape.

Mail the coupon below for General Catalog illustrating the complete Gorton line.

PRODUCTION DATA—

JOB: Profile 6 locking lugs for male and female sections of new 3.5" Bazooka

MATERIAL: Aluminum alloy

CUTTER: 5/32" dia. single flute, fast spiral H. S. steel running at 3,900 R. P. M., without coolant

MASTER: 2 masters: one for male and one for female sections; 3 times oversize, traced manually

HOLDING FIXTURE: Pneumatic-operated internal expanding type

APPROX. TIME: 36 pieces per hour

ALTERNATE METHODS: None practical

GEORGE GORTON MACHINE CO.



Please send at once complete information about the Gorton line contained in Bulletin 1655-1702.

Firm .....

Name .....

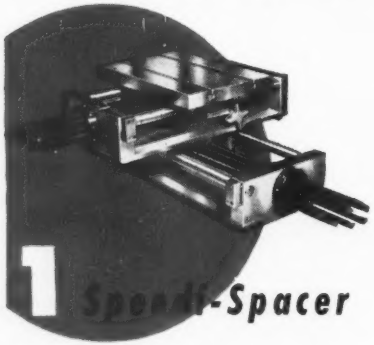
Title .....

Address .....

City, State .....

1702 Racine St., Racine, Wis., U.S.A.

Time savers in any shop



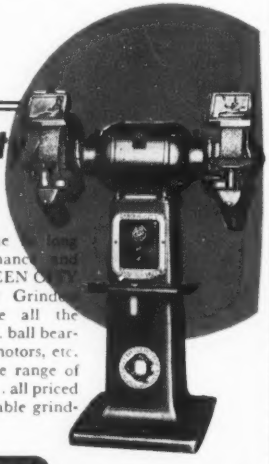
1 Speedi-Spacer

This jig-for-all-jobs makes any good upright or radial drill the equal of an expensive jig borer in speed and accuracy. SPEEDI-SPACER saves the cost of and waiting for, jigs and fixtures, as well as their storage, obsolescence and maintenance. Does big jobs fast at lowest cost.

2

Queen City Grinders

Here's extra value in long life, low maintenance and low first cost QUEEN CITY Bench and Floor Grinders and Buffers have all the quality features . . . ball bearings, heavy duty motors, etc. . . . in a complete range of sizes and models . . . all priced far below comparable grinders and buffers.



QUEEN CITY MACHINE TOOL CO

WRITE TODAY FOR DETAILED LITERATURE

QUEEN CITY MACHINE TOOL CO.
233 E. 2nd Street, Cincinnati 2, Ohio

The Balmar Corporation Now Franklin Balmar Corporation

J. N. Merkle, president, The Balmar Corp., Woodberry, Baltimore, Md., has announced that the name of the firm has been changed to Franklin Balmar Corporation to better identify the scope of the business being conducted. Franklin Balmar Corporation will continue as the manufacturing subsidiary of Franklin Railway Supply Company, and the officers will remain the same, with the addition of J. E. Long as vice president in charge of product sales and J. J. Kirchhof as vice president in charge of engineering.

General administrative, sales, and engineering offices of Franklin Balmar Corporation will be located at the Baltimore plant, as well as the manufacturing and sale of railroad products.

Tocco Announces Contest Winners

The Tocco Heating Division of The Ohio Crankshaft Co., Cleveland, Ohio, has announced the winners of its 1952 "Economy in Production" contest. All entries were descriptions of the savings of time and money effected by actual Tocco induction heating installations. Lloyd E. Raymond, metallurgist, Singer Mfg. Co., Bridgeport, Conn., received the first prize of $1,000. Mr. Raymond's prize-winning paper showed how the Tocco process had reduced hardening time 62 per cent in the manufacture of parts for Singer sewing machines.

Other prize winners and the amounts won are as follows: John P. Isaacs, Norris Thermador Corp., Los Angeles, Calif., $600; Henry C. Fischer, chief, Mechanical Branch, Production Division, Edgewood Arsenal, Army Chem-

DEPT. OF DEFENSE work . . . by *LINDBERG* Induction Heating Units



L. A. Young Spring & Wire Corp., Detroit, Mich., use two 5 KW Lindberg Induction Heating Units for production brazing, soldering, hardening, annealing, stress relieving, hot forming, forging or shrink fitting requirements.

We can't tell you much about the manufacturing processes at the L. A. Young plant (due to security restrictions) . . . but we can tell you about the many rugged construction features of this equipment . . . features which make it so dependable that the L. A. Young organization selected Lindberg Induction Heating Units for their important Department of Defense work. These points of design and construction will minimize costly breakdowns and aggravating work stoppages:

Filament voltage regulation transformers keep tube filament voltages at proper values regardless of line fluctuations. The end result . . . longer tube life.

Checklites . . . A system of indicating lamps instantly reveals any abnormal operating conditions . . . simplifies servicing.

Work coil burn-out protection . . . An electrical interlock system makes it impossible to turn on power when cooling water is not flowing.

Long-life industrial tubes feature shortened internal structure . . . Kovar metal-to-glass Seals . . . heavy walled anodes.

Sealed tank capacitors are hermetically sealed against dirt and dust . . . require no servicing or refilling.

Investigate Lindberg Induction Heating Units. Ask for Bulletin 1440.

LINDBERG

HIGH FREQUENCY DIVISION

LINDBERG ENGINEERING COMPANY,
2450 West Hubbard Street, Chicago 12, Illinois

ical Center, Edgewood, Md., $600; R. H. Lauderdale, metallurgist, Northern Ordnance, Inc., Minneapolis, Minn., $400; and J. C. Scullin, Cardinal Machine Co., Glendale, Calif., $100.

Warren Elected President of Mac-it Parts Company

Mac-it Parts Co., Lancaster, Pa., has announced the election of Henry E. Warren as president of the company, succeeding the late John S. Cochran. Mr. Warren was one of the three founders of the Mac-it Screws Company when it was formed in 1911 to produce heat-treated alloy steel screws. At first the company produced only square head set screws, but it was soon found that alloy steel was equally valuable for cap screws.

In 1912, the company began manufacturing alloy steel hollow set screws. To enable the company to grow, the partnership was dissolved and the Mac-it Parts Company was formed. Mr. Warren has been general manager of the company since 1916, secretary since 1933, and a director from the time the corporation was formed. All Mac-it products have been marketed nationally since 1913 by Strong, Carlisle & Hammond Co., Cleveland, Ohio.



Henry E. Warren

We Proudly Present . . .

OUR NEW LINE OF

Star Dust ★ DIAMOND WHEELS AND HONES

. . . With New Type Bond!

This new and complete line of diamond wheels and hones is in the same tradition of excellence as our famous laboratory graded STAR-DUST diamond lapping compounds and powders.

After years of product research we have developed our own special bonds which are proving definitely superior in use. For free cutting, durability and a minimum of loading, it will pay you to investigate this new addition to the STAR-DUST line. There are all types and sizes, and deliveries are excellent . . . We invite your trial orders!

Write us today for comprehensive new catalog B-7.

You're "Laps Ahead" with Star Dust

DIAMOND WHEELS AND HONES • DIAMOND LAPPING COMPOUNDS AND DIAMOND POWDERS

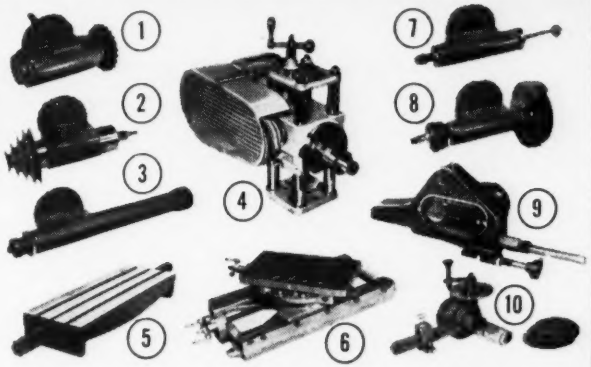
ACE ABRASIVE LABORATORIES | 250 WEST 57th STREET NEW YORK 19, N. Y.

master
MACHINE TOOL ATTACHMENTS

for

LATHES
TURRETS
MILLS

OR USE INDEPENDENTLY



1. 90° Universal Milling Head
2. Hi-Speed Milling and Drilling Head
3. Deep-Hole Internal Grinder Head
4. Basic Milling Unit
5. Milling and Grinding Table
6. Universal Feed Table
7. Internal Grinder Head
8. External Grinder Head
9. Slotting and Keyseating Head
10. Geared Dividing Head

Master MACHINE TOOLS

★ ★

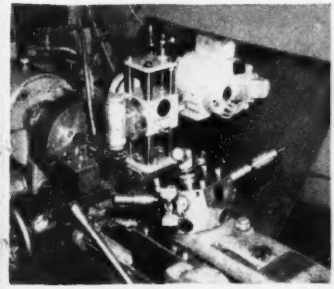
THREE SIZES

MODEL "C," ⅓ hp — 9" TO 13" LATHES
MODEL "B," ½ OR ¾ hp — 13" TO 18" LATHES
MODEL "M," 1 OR 1½ hp — 18" TO 72" LATHES

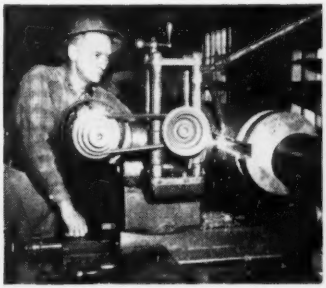
★ ★

The Master attachment can be used profitably on many production operations. Mount it on your present equipment, lathes, turrets, mills, or use independently to perform additional operations in the same set-up. The basic milling unit with the above types of precision heads gives you facilities for milling, grinding, boring, drilling, indexing, slotting, and keyseating, internal and external. Its full complement of equipment is an outstanding value for maintenance, repair, tool room, and experimental shops, as well as production, thus performs a full range of shop operations at a minimum investment. These improved models are outstanding in rigidity, capacity, and simplicity of set-up and operation and incorporate the latest features developed in our 17 years of manufacturing this tool. Investigate this valuable shop tool. For the cost of one single-purpose machine, you can have several Master units producing. Prompt deliveries.

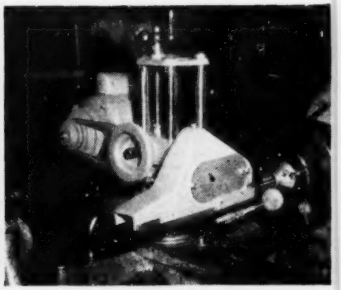
MAKES LOW-COST INDEPENDENT PRODUCTION SET-UPS — PORTABLE — SELF-POWERED



Milling on turret lathe completing part in one set-up



End Milling 2½" keyway in 9⅞" diameter shaft 22 ft. long



Master Slotting Head on lathe cutting internal taper keyway

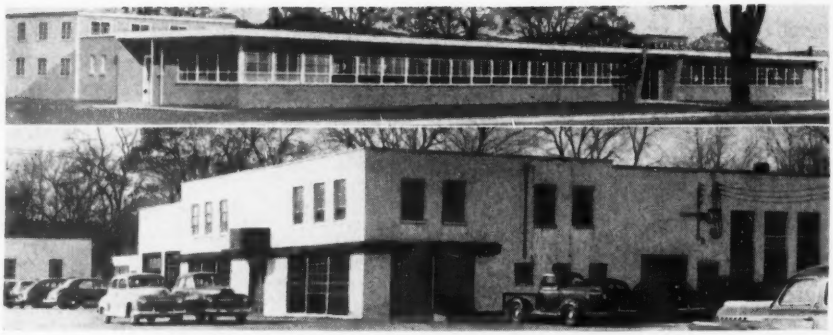


FREE

WRITE FOR NEW ILLUSTRATED 24-PAGE CATALOG

MASTER MANUFACTURING CO.

1310 EAST AVENUE A ▪ HUTCHINSON, KANSAS, U.S.A.



(Top) New office and engineering building of The O.K. Tool Co., Inc., Milford, N. H. Plant No. 1 is at the right, and Plant No. 2 is located at the rear. (Bottom) The recently renovated Plant No. 3 of The O.K. Tool Company, Incorporated.

O.K. Tool Erects New Office and Engineering Building

The O.K. Tool Co., Inc., Milford, N. H., has announced the opening of its new office and engineering building, shown herewith in the top illustration. Plant No. 1, the one-story structure, is engaged in the manufacture of the company's complete line of cutters, reamers, boring bars, and multiple-operation tools. Plant No. 2, the two-story building located behind Plant No.

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FREE COPY

NEW ACME BUSHING CATALOG

Contains America's
LARGEST BUSHING SELECTION

Features 2 Standards
A.S.A. *Plus* Acme

Makes Bushing Procurement Easy... Fast!



Simplifies, speeds bushing selection. Packed with valuable data. Saves you time and trouble. Also includes liners, leader pins, dowel pins, locating jigs, etc.

Send For Your Free Copy Now!

ACME
INDUSTRIAL COMPANY

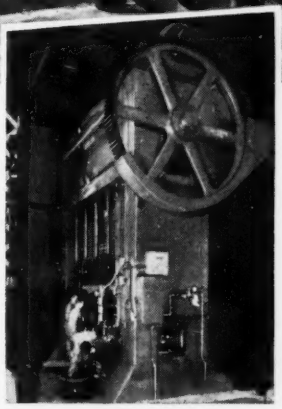
212 N. Laflin St., Chicago 7, Illinois

MANUFACTURERS OF STANDARDIZED DRILL JIG AND FIXTURE BUSHINGS



How FALLS STAMPING makes *5 times 12 equal 180*

Five men handling 12 stations, turn out 180 vital parts per hour at The Falls Stamping and Welding Co., Cuyahoga Falls, Ohio. According to John J. Lange, Falls Stamping executive, "We purchased this new 900 ton Cleveland double crank press to speed production for the defense program. We chose a Cleveland, for this, our largest press, because we have had such satisfactory service from our previous 7 Clevelands. Installed in April of this year, this press has been in operation steadily . . . has exceeded our performance expectations. In that period there has been no noticeable die-wear. The Cleveland Drum Type Friction Clutch and Brake has given us the control and speed necessary to obtain excellent production and yet safeguard the operators."



For outstanding press production make your next press a Cleveland! Let an experienced Cleveland engineer recommend the exact Cleveland best suited to your requirements. Write or call today!

A-6474

THE CLEVELAND PUNCH & SHEAR WORKS CO. U.S.A.

Established 1880

PUNCHING TOOLS & DIES

FABRICATING TOOLS

POWER PRESSES

OFFICES AT
NEW YORK . . . CHICAGO
DETROIT . . . PHILADELPHIA
E. LANSING

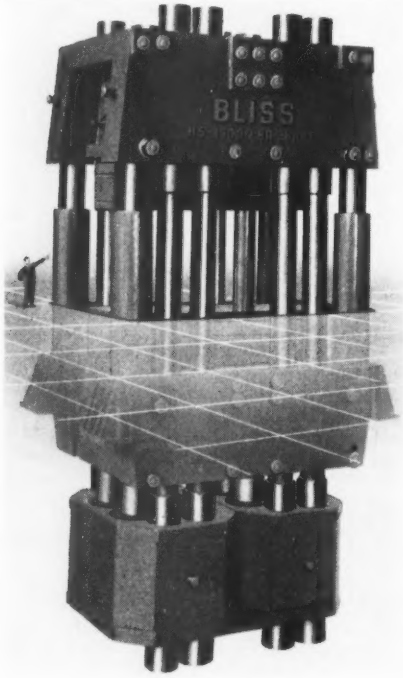
CLEVELAND 14, OHIO

1, performs the finish-grinding operations on the blades and tool bits. Plant No. 3, shown in the lower illustration, houses the carbide heat-treating and shipping departments. This plant has recently been remodeled, and a new layout is said to provide for expanded operations of the departments housed therein.

Proceedings of 16th Annual Time and Motion Study and Management Clinic. Published by Industrial Management Society, 35 E. Wacker Drive, Chicago 1, Ill. 168 pages. Illustrated. Price, $4.00.

This volume comprises the proceedings of the 16th Annual Time and Motion Study and Management Clinic sponsored by the Industrial Management Society and held November 5, 6, and 7, 1952, at the Sheraton Hotel in Chicago. Included in the 168 pages of the book are charts, forms, and illustrations. Complete transcripts of talks by top leaders of labor, management, and government on various topics, including time study, motion economy, methods, plant layout, materials handling, wage incentives, maintenance, and human relations, are provided.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.



35,000-Ton Closed-Die Forging Press

THE accompanying illustration is an artist's conception of the appearance of the 35,000-ton closed-die forging press that is being installed in the new Air Force Plant in Newark, Ohio, to be operated by the Kaiser Aluminum and Chemical Company. Built by the E. W. Bliss Co., Canton, Ohio, the press measures 72 feet from top to bottom with 33 feet above the floor level. It weighs 12,000,000 lb. and has a die area 24 x 12 x 11 feet high. Besides this press, Bliss is also building a 25,000-ton forging press to be located at the same plant and three auxiliary presses with capacities of 8,000, 5,000 and 3,000 tons. A fourth 1,500-ton press is also being moved into the new Newark plant.

NOW... FASTER SET-UPS ... GREATER ACCURACY IN ANGULAR GRINDING...

Magna-Lock SINE

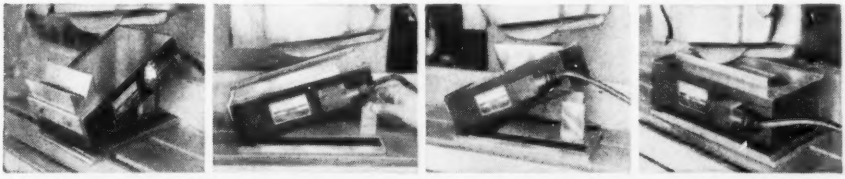


WHAT IT IS:

Magna-Lock Sine is a specially designed electro-magnetic chuck for making precision angular set-ups on surface grinders. Standard gauge blocks insure accuracy that's impractical to attain by other means. No dials, no scales... the only moving part is a simple, rugged, precision-made hinge.

WHAT IT DOES:

Whether a set-up requires single or compound angles, with Magna-Lock Sine they can be made in minutes, saving hours of set-up and machine-time. Magna-Lock Sine's powerful magnetic attraction holds work securely, minimizes distortion or warpage during the machining operation.



Send *now* for full details on Magna-Lock Sine, developed by MAGNA-LOCK ... *first* to increase your machine's productivity. Write Dept. MM-23

Magna-Lock

MAGNA-LOCK, INCORPORATED

Magnetic Chucks and Devices

BIG RAPIDS, MICHIGAN, U. S. A.

Metal-Working News in Brief

Four Aluminum Company of America casting division employees have been named to higher posts. **Sanford H. Bennett,** works manager of the company's Buffalo Works, has been named chief industrial engineer of the casting division, succeeding the late **Rodney C. Rankin** who died recently. **H. E. Cook,** superintendent of the Buffalo Works, succeeds Mr. Bennett as works manager. **Norbert C. Hilbrecht,** chief industrial engineer of the Buffalo Works, has been named superintendent of that works, and **Sherwood Willard** has been named to the post vacated by Mr. Hilbrecht.

—o—

The appointment of **Frederic C. Perron** as field engineer in the southeastern New York territory has been announced by The Bellows Co., Akron, Ohio. Mr. Perron's headquarters will be at The Bellows Co., 7 W. Broad St., Mt. Vernon, New York.

—o—

Colonial Broach Co., Detroit, Mich., has announced the appointment of **Hans K. Reitz** as factory manager, succeeding **William Kukuk** who has resigned to devote full time to the sales of Colonial drill jig bushings.

—o—

The name of Graham-Mintel Instrument Co., Cleveland, Ohio, has been changed to **Cleveland Instrument Company, Inc.** The company's personnel, products, facilities, location, and ownership remain unchanged.

ARROW TOOL & REAMER CO., Established 1916

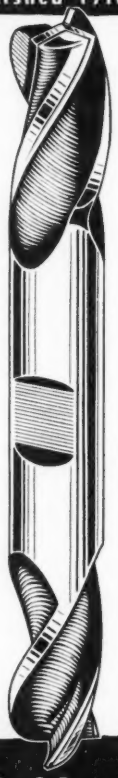
ARROW

END MILLS

A COMPLETE LINE

Arrow's engineering skill and production experience gained during 36 years as a major supplier of precision tooling is your assurance of custom quality, prompt service and superior performance.

Write today for details on Arrow's simplified fast service on "Specials"



ARROW TOOL & REAMER CO.

418-422 LIVERNOIS AVE. • DETROIT 9, MICH.

"— and they chopped down the Old Pine Tree."



Woodsmen Use Marking Devices!

When a forester indicates a tree is to be cut by the lumberjack he usually paints a mark just above the ground and another about breast-high, indicating it is to be cut for lumber purposes. If the tree is diseased he usually marks it with an X or other suitable device, indicating that it is to be cut for destruction or firewood.

CADILLAC MARKING DEVICES

are Designed for ALL MARKING PURPOSES

Whatever your requirements, from small Hand Stamps to Pneumatic, Hydraulic or especially created Marking Machinery, CADILLAC stands ready to supply or design and build to meet your needs.





HEAVY BEVEL HAND STAMPS

CADILLAC Heavy Bevel Letters and Figures combine a high degree of hardness with toughness, insuring exceptionally long life.

INTERCHANGEABLE TYPE and TYPE HOLDER SETS

The faces of CADILLAC Steel Letters and Figures combine a high degree of hardness with toughness, insuring especially long life. All CADILLAC Marking Type and the recess in Type Holders are made in standardized dimensions. This means that type will fit interchangeably in hand holders, marking machine holders or punch press holders designed for the size type specified. Due to the precision adhered to in manufacturing, they will when assembled in any holder make impressions in perfect alignment.



HAND STAMP SYMBOLS

A system of distinctive symbols for inspection and confidential markings. Write for Symbol Chart.

CADILLAC STAMP CO.

FACTORY and OFFICES

17319 RYAN ROAD • DETROIT 12, MICH.

Metal-Working News in Brief

Clearing Machine Corp., Chicago, Ill., has announced the appointment of **Erwin J. Baumrucker** as executive assistant to J. R. Bartizal, executive vice president. Mr. Baumrucker has been associated with Clearing since 1937 and, until recently, was acting manager of the company's London, England, office.

Kearney & Trecker's Special Machinery Division has announced the appointment of **Morris L. Hutchens** as chief engineer, **Walter J. Hubbes** as superintendent of manufacturing operations, **Harold W. Kippers** to direct sales activities, and **John P. Bunce** as staff assistant to the division manager.

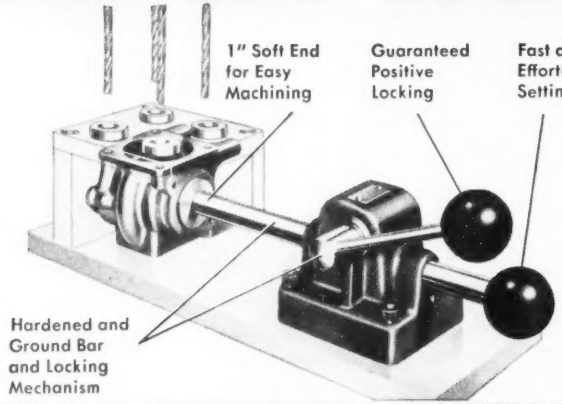
— o —

Vascoloy-Ramet Corp., Waukegan, Ill., has announced the following changes in its organization: **George T. Brennan,** works manager; **Paul J. Guentherman,** general superintendent; **Robert E. Bateman,** personnel manager; **Leo Paluska,** purchasing agent; **Clifford J. Nauta,** manager of sales promotion and publications; **John M. Allen,** eastern region; **Burton Naden,** sales manager, central region; **Quentin H. Castricone,** sales manager, western region; **Russell O. Moore,** sales manager of mining tools; **Dwight F. Clark,** sales manager of investment castings; and **L. K. Adams,** manager of export sales.

ANNOUNCING!

HEINRICH SCREWLESS *Grip-Master*

FIXTURE LOCK



BOOSTS PRODUCTION, EFFICIENCY

Now—at the request of industry—we offer the new "Grip-Master" Screwless Fixture Lock, applicable for fixtures and jigs used in drilling, milling operations, etc. It incorporates the same high-quality locking mechanism proved by industrial use in the famous "Grip-Master" Screwless Drill Press Vise. Pays for itself quickly by increasing production, cutting tooling costs, etc. See your Dealer, or write for details.

NATIONAL MACHINE TOOL COMPANY

DEPT. 113-B • RACINE, WISCONSIN

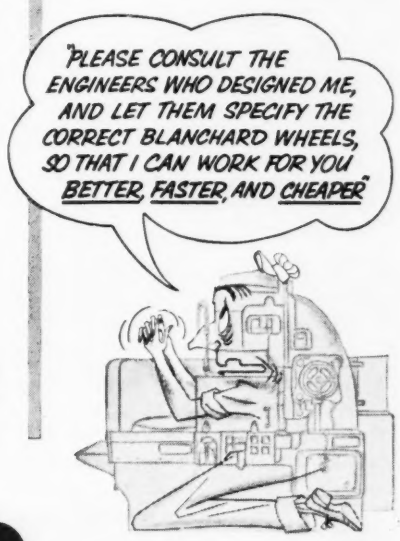
UNCLE!

Are your machines begging for mercy because of misuse?

Blanchard Grinders, *with proper grinding wheels, can* and *do* give high production with extremely close tolerances for dimension and flatness. However, a No. 11 Blanchard user recently received erroneous advice on abrasive wheels from an outside source. The result was that 35 high-speed cam plates were ground on both sides in 1¾ hours with surface finish of 24 micro-inches.

By referring the problem to Blanchard, it was easily demonstrated that the No. 11, with correct grinding wheel, would give desired results—90 to 100 cam plates per hour, with surface finish of 4 micro-inches, dimension tolerance of ± .0002, and flat within 2 light bands.

Blanchard wheels are best for Blanchard Grinders — let Blanchard give you the benefit of their vast experience so that you too can get the most from your Blanchard machines.



Information on correct surface grinding procedure and wheel selection are given in "Work Done on the Blanchard" and "The Art of Surface Grinding." Write for free copies today!



PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY **64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.**

Metal-Working News in Brief

Boyar-Schultz Corp., Chicago 12, Ill., has announced the opening of a branch office located at 2462 E. Slauson Ave., Huntington Park, Calif., to service the Los Angeles metropolitan area. The branch will carry a complete stock of the company's surface grinders, profile grinders, screw machine tools, copper head laps, and T-slot bolts.

The Holo-Krome Screw Corporation has announced the appointment of **Richard A. Modig** as general sales manager. Mr. Modig's headquarters will be in the company's main office in Hartford, Connecticut.

— o —

Sun Oil Co., Philadelphia, Pa., has announced the appointment of **William B. Daub** as assistant advertising manager for industrial products. Mr. Daub joined the company in 1945 and was formerly a special representative for Sun's industrial advertising department.

— o —

Tuthill Pump Co., Chicago, Ill., has announced the promotion of **J. D. Young** to field sales manager and **W. F. Rye** to sales service manager. Mr. Young was sales service manager, and Mr. Rye his assistant.

— o —

Philip H. Threshie, Jr., and **Roderick L. Smith** have been appointed field engineers for Norton Co., Worcester 6, Mass. Mr. Threshie will serve in the Pacific coast district, and Mr. Smith will serve the Chicago territory.



Depend upon

Zagar FIXTURES, too!

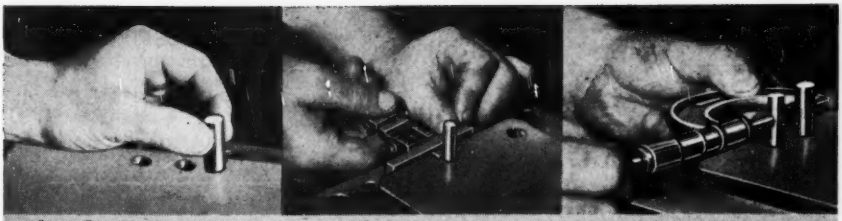
When all is said, this is the first, middle and last consideration — that fixtures, holding and indexing, must HOLD. On that score, Zagars have qualified famously for years — in simple and intricate machining operations. Accurate construction gives accurate performance. Zagar also has a complete line of air-operated holding fixtures and collet lathe chucks. Prompt deliveries *NOW!*



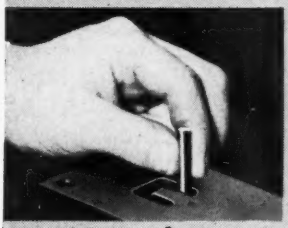
Write for Engineering Manual S-2

ZAGAR TOOL, INC., 24000 Lakeland Blvd., Cleveland 23, Ohio

Zagar TOOLS FOR INDUSTRY and SPECIAL MACHINERY

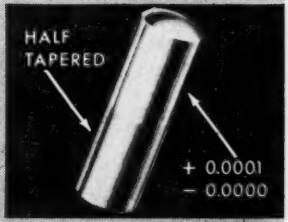


Check hole sizes and locations, find centers,



gage slots,

and dozens of other uses with **HORBERG** precision taper



Pin Gages

SAVE TIME AND MATERIALS

Oil-hardened tool steel tapered pin gages accurate to + 0.0001" − 0.0000" insure dependable sizing and location of holes and slots for machinists, set-up men, tool and die men, inspectors, all who need precise hole measurement.

CONCENTRIC TAPER on lower half of each gage fits holes 0.0012" smaller than standard letter, fraction, and number size drill holes. Makes insertion easier. Permits gaging of odd-size holes and slots.

ALL GAGES are 1½ inches long. Sets contain a pair of each size in a plastic case with 4-place decimal equivalents of each size plainly marked.

ALL ITEMS STOCKED FOR IMMEDIATE DELIVERY

THE *Horberg* GAGE COMPANY

23 STAPLES ST., BRIDGEPORT, CONN.

Quantity

..... Letter sets @ $45. 52 gages (A-Z)

..... Fraction Sets @ $50. 60 gages (3/64" to 1/2" in 1/64" steps)

..... Number Sets @ $90. 120 gages (1 to 60)

..... Single gages @ $ 1.

..... Stand alone @ $10.

Please Rush checked items and literature to

company.....

address.....

name.....

title.....

Metal-Working News in Brief

Cooper Tool & Engineering Co., 4221 Excelsior Blvd., Minneapolis 16, Minn., has been awarded the cutting tool franchise for the Northwest area by Standard Tool Co., Cleveland, Ohio. Cooper Tool will handle the complete Standard line of cutting tools, including twist drills, reamers, counterbores, milling cutters, hobs, and end mills.

The establishment of a news bureau to handle trade and popular press relations has been announced by Carboloy Department of General Electric Co., Detroit 32, Mich. **Charles E. St. Thomas** has been named manager of the news bureau.

— o —

Clifton G. Bigwood, director and vice president in charge of operations, The L. S. Starrett Co., Athol, Mass., died recently after 36 years of service with the company. Mr. Bigwood was a member of the North Central Massachusetts Chapter of The American Society of Tool Engineers, a former member of the Athol Housing Authority and Advisory Board, and was also active in Masonry.

— o —

Louis Welt, president, **Steel City Testing Machines, Inc.,** has announced that the company has moved from 8843 Livernois to a new plant located at 8817 Lyndon Ave., Detroit 21, Mich. The move was necessitated by an increased volume of business.

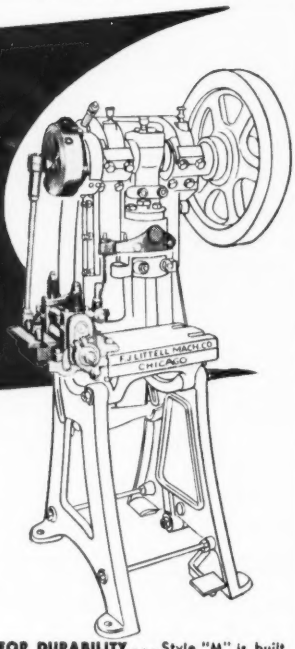
FOR LOW COST AND BIG RESULTS

Feed Your Presses With

LITTELL

STYLE "M" AUTOMATIC

ROLL FEED



FOR SPEED . . . With Style "M" automatic feeding your press can easily produce 9,000 stampings an hour at 200 strokes per minute, or 4,600 stampings an hour at 100 strokes per minute.

FOR VERSATILITY . . . Style "M" feeds left to right, right to left and front to back. Feed direction can be reversed by simply reversing clutch. Feed lengths per stroke are 0 to 4⅜" with standard gears and 0 to 8½" with compound gears.

FOR ADAPTABILITY . . . Style "M" is adaptable to any standard punch press. It feeds coil stock up to 8" wide and up to .055" thick (17 gauge).

FOR SAFETY . . . Style "M" automatic feeding keeps hands and fingers away from danger, prevents costly accidents.

FOR DURABILITY . . . Style "M" is built with hardened and ground feeding rolls and the other quality features that have made Littell Roll Feeds accurate and durable since 1918.

FOR ECONOMY . . . Style "M" brings you a big saving in price. It gives your presses the lowest insurance rate. It cuts your cost per stamping by multiplying press output.

WRITE FOR CATALOG

F. J. LITTELL MACHINE CO.

ROLL FEEDS • DIAL FEEDS • STRAIGHTENING MACHINES • REELS • AIR BLAST VALVES

District Offices: Detroit, Cleveland

4163 N. RAVENSWOOD AVE. • CHICAGO 13, ILL.

INCREASES PRODUCTION...

LOWERS COSTS...

PAYS FOR ITSELF QUICKLY...



The ROUSE HAND MILLER is a widely used, inexpensive, high speed, ball bearing, motor driven machine for handling light cuts in brass, aluminum, steel, plastics, and other materials—fast, accurately, and at very low cost. Only $106.00.*

Fixtures (illustrated) extra.

Motor equipment:—¼H.P. 110 Volt AC 60 cycle, single phase, swivel motor mount and light—$29.00.*

**All prices FOB Chicago.*

- ★ **MILLS SMALL PARTS MUCH FASTER.**
- ★ **DRASTICALLY CUTS YOUR INVESTMENT IN EQUIPMENT.** Replaces expensive production machinery—or releases it for other jobs.
- ★ **INEXPERIENCED HELP CAN OPERATE IT.** Safe, simple, fool-proof operation.
- ★ **NO MORE COSTLY SET-UP TIME. $106.00*** price so low that it pays to keep one or more Hand Millers always set-up for special operations.
- ★ **YOU GET A BETTER PRODUCT**—the result of ABSOLUTE ACCURACY.
- ★ **A LOSS BECOMES A PROFIT** when marginal pieces are finished on the Hand Miller instead of on high cost equipment.
- ★ **VERY LOW MAINTENANCE.**
- ★ **USED REGULARLY IN 1163 MANUFACTURING PLANTS** (some of which use as many as 30 machines)—yet on the market a scant few years.
- ★ **UNIQUE—VERSATILE.** Nothing else like it. One or several machines can be the answer to some of *your* production problems.

Write today for further information.

H. B. ROUSE & COMPANY

2214 N. WAYNE AVE., CHICAGO 14

50 YEARS OF SERVICE TO INDUSTRY

Metal-Working News in Brief

Firth Sterling Inc., Pittsburgh 30, Pa., has announced the appointment of **William E. Henry** to the sales department in the Pittsburgh district. Mr. Henry was previously with Lakeview Mfg. Co., Latrobe, Pennsylvania.

— o —

Gilbert T. Coovert has been appointed general manager of the V & O Press Co., Division of Emhart Mfg. Co., Hudson, N. Y. Mr. Coovert joined the company in 1950 as personnel manager and has successively been acting factory manager, factory manager, and assistant general manager.

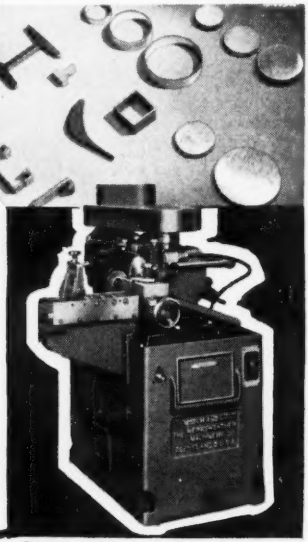
— o —

Morey Machinery Co., New York 13, N. Y., has announced the appointment of **E. Payson Blanchard** as director of sales in charge of New Domestic Machinery Division. Mr. Blanchard joined the company in 1952.

Investigate, too, This Aid to Production



GET EXCLUSIVE ADVANTAGES in the Cutting Off of Small Stock and Shapes with the No. 00 MOTCH & MERRYWEATHER CIRCULAR SAWING MACHINE, Employing the Triple-Chip METHOD



Shown—No. 00-A, automatic.

Make the Most of These Distinct Advantages

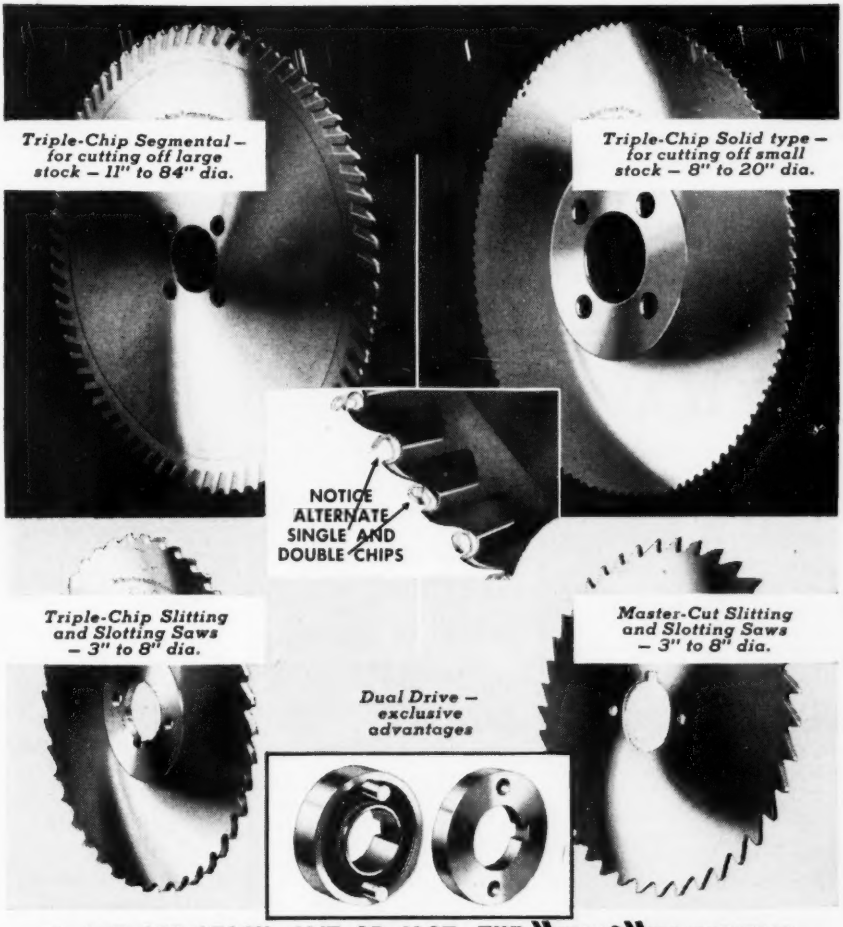
For the most favorable results, time- and profit-wise, use Motch & Merryweather's superb coolant. Anti-weld, averting pick-up. Sharper tools and longer-lived. Oily, but not "greasy". Smokeless, odorless. A real aid to money-making production.

For any ferrous or non-ferrous metal, titanium to magnesium. Square, burrless ends accurate to length with the Triple-Chip method. Available in automatic or manual stock feed. Capacity—up to 3" dia. tubes or shapes. Get full details.

Only M & M builds ALL 3: CIRCULAR SAW · BAND · BLADE GRINDER

THE MOTCH & MERRYWEATHER MACHINERY CO.
715 PENTON BUILDING • CLEVELAND 13, OHIO

• PRODUCTION-WITH-ACCURACY MACHINES AND EQUIPMENT •



TO CUT OFF STOCK, SLIT OR SLOT, THE MOTCH & MERRYWEATHER TRIPLE-CHIP SAW BLADE OFFERS MANY EXCLUSIVE ADVANTAGES

Fast, burrless cut-off and slitting or slotting with with Dual Drive which makes stresses and breakage negligible. Let M & M Triple-Chip saw blades give you the higher *production-with-accuracy* which Industry must attain and maintain today. Also Master-Cut conventional type with M & M's exclusive Dual Drive. Ask your dealer.

Triple-Chip METHOD

Only M & M builds ALL 3: CIRCULAR SAW SAW BLADE BLADE GRINDER

THE MOTCH & MERRYWEATHER MACHINERY CO.
715 PENTON BUILDING • CLEVELAND 13, OHIO

...IT'S THE COST PER CUT THAT COUNTS...

Metal-Working News in Brief

Edward G. Petherick, Los Altos, Calif., has retired after 25 years with Norton Company as an abrasive engineer covering northern California, southern Oregon, and western Nevada. **Norman R. Ekholm,** 714 99th Ave., N. E., Route 2, Bellevue, Wash., abrasive engineer in Washington, northern Oregon, Idaho, and Montana, will replace Mr. Petherick.

Howard A. Reid, former advertising and sales promotion manager of General Cable Corporation, has joined American Machine & Foundry Company as advertising and sales promotion manager of AMF's General Products Group which includes the Lowerator dispenser used widely in the food service industry; Wahlstrom chucks and tapper attachments; the products of AMF's Leland Electric Division, Dayton, Ohio; and those of AMF subsidiaries: Cleveland Welding Co., Cleveland, Ohio; DeWalt Inc., Lancaster, Pa.; Float-Lock Corp., Bloomfield, N. J.; Junior Toy Corp., Hammond, Ind.; Sterling Engineering Co., Inc., Laconia, N. H.; Thompson-Bremer & Co., Chicago, Ill.; and Leland - Electric Canada, Ltd., Guelph, Ontario.

— o —

Paul F. Aaron, previously associated with Crosley Division, Avco Corp., has been appointed plant manager of The Cincinnati Tool Co., Cincinnati, Ohio. Mr. Aaron will have complete charge of production planning.

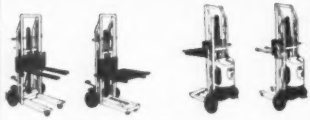
TRY IT AND See... HOW EASY those heavy jigs, crates or barrels can be lifted, moved, stacked or stored... when BIG JOE does it!



The platforms or forks, loaded to 750 or 1000 pounds capacity, are easily raised and accurately stopped by the powerful hydraulic assembly at any level between floor and lifting heights of 54, 56, 68 or 80 inches. BIG JOES are always on the level with tailgate, shelf, machine or pallet for loading or unloading.

Priced Right for Economical Materials Handling Anywhere

Write for Specifications



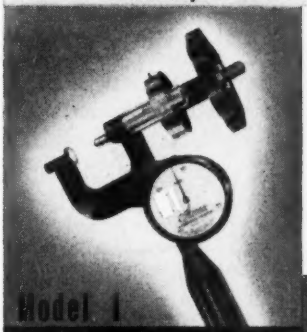
"Step-on-it" Manual Models from $236.50
Battery Powered Models from $587.50

BIG JOE
MANUFACTURING COMPANY
900-04 W. JACKSON BLVD.
CHICAGO 7, ILLINOIS



Ames PORTABLE HARDNESS TESTERS

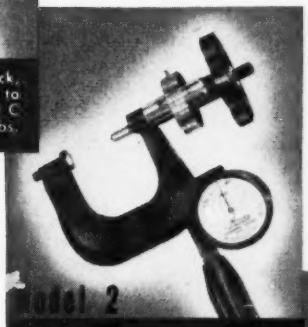
FOR QUICK, ACCURATE ROCKWELL HARDNESS TESTS



Model 1

For testing round and flat stock, tubing, saws, knives, etc., up to one inch in Rockwell A, B and C Scales. Weighs only 1½ lbs.

Frequent hardness testing of metals before and during fabrication and after heat treating is essential today for best results. Ames Portable Testers are light in weight; are carried to the work for quick, accurate, dependable tests, reading directly in the Rockwell Scales. No skill is required. Anyone can operate. Thousands now in use.



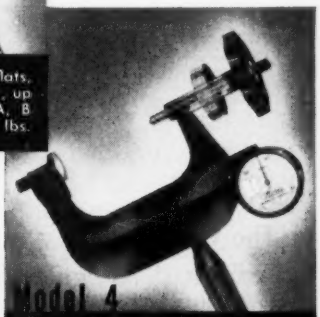
Model 2

For testing rounds and flats, dies, odd-shaped pieces, etc., up to two inches in Rockwell A, B and C Scales. Weighs 2½ lbs.

Other models for testing up to 6". Send for descriptive literature or ask for demonstration in your plant.



Cast Iron Bench Stand permits use of both hands when testing small parts. Tester is inclined at convenient angle and is firmly clamped in stand.



Model 4

For testing up to four inch capacity in Rockwell Scales. Two inch throat depth. Weighs 3¼ lbs. Model 4-4 has four inch throat depth.



Box for Tester and Accessories Equipment includes diamond and 1/16" ball penetrators, two anvils, two steel test blocks, one brass test block and Rockwell Conversion Chart.

AMES PRECISION MACHINE WORKS

Makers of Ames Precision Lathes and Bench Millers

WALTHAM 54, MASSACHUSETTS

Metal-Working News in Brief

The Engineering Division of the Gulf Research & Development Company, the research organization of Gulf Oil Corp., Pittsburgh, Pa., has been divided into two new divisions—engineering and automotive engineering. **E. Topanelian, Jr.,** has been appointed director of engineering, with **Bruce R. Walsh** as his assistant. **J. Edward Taylor,** formerly a member of the Product Development and Product Engineering Department, has been transferred to the Research Department as director of automotive engineering, with **Charles R. Butler** and **R. L. Kirkpatrick** serving as his assistants.

—o—

Skinner Electric Valve Division of The Skinner Chuck Co., New Britain, Conn., has announced the appointment of **William E. Rogers** as sales manager. Mr. Rogers will have complete charge of distribution and market research in connection with the solenoid valves manufactured by the Skinner Electric Valve Division.

—o—

Warren S. Gardner, Jr., has been appointed southern representative for Bay State Tap & Die Co., Mansfield, Mass. Mr. Gardner's territory will cover the states of Virginia, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Tennessee, and Louisiana (east of the Mississippi River).

Save time...

ENGRAVE your own NAMEPLATES

DIALS • PANELS



The fastest, easiest method for engraving individual nameplates, dials and panels.

- Automatic depth regulator.
- Engraves 15 sizes from One master alphabet.
- Equipped with self-centering device.

Send for Catalog IM 27

NEW HERMES, Inc. 13-19 University Place, N.Y. 3
In Canada: 359 St. James St., Montreal
World's Largest Manufacturer of Portable Engraving Machines

USERS' ENTHUSIASM FOR *Lusol* SPREADS FAST FROM SHOP TO SHOP

Machine operators and their bosses, too, learn firsthand how Lusol speeds their production, lengthens tool life and makes working conditions more enjoyable. Then they tell the story around town and, soon, we get a phone call, "Show me!" The following stories are typical of many we've picked up from Lusol users all over the country.

"A new machinist

heard that drill 'screaming for help' and suggested trying Lusol there. Since this 2½" drill costs $60 and we had to sharpen it several times in drilling a hole 3" deep, we really saved money with Lusol. Now the chips come out cool and we drill 7 or 8 pieces between resharpenings."

"As a subcontractor

we are welding stainless steel strip into jet engine exhaust pipes. That weld line machined badly and caused smoking. Our principal manufacturer recommended Lusol, which we put in a year ago last November. We're getting a beautiful finish, increased speeds and feeds, longer tool life and no smoke."

"Here in our own plant

the foreman of our lathe department saw us having trouble grinding silver off steel bearing-retainer-rings. The wheels would load up instantly and gouge the steel. Wheel manufacturers tried many different abrasives, but with no luck. We put a Lusol solution into those grinders and now our ordinary wheels do the job. 20 micro finish!"

"A grinding wheel salesman

told me that wheels (a competitor's, too) weren't our trouble. We were rough-grinding only 3 to 5 pieces before the wheels needed redressing. He suggested a change to Lusol, and now we grind 20 pieces with one wheel dressing. Of course, we're buying his wheels now."

Send for a free copy of the booklet
"Lusol Gets to the Point"

F. E. ANDERSON OIL COMPANY, INC.
216-I Portland, Connecticut

Metal-Working News in Brief

Harold Burnip has been appointed director of purchases by Lincoln Electric Co., Cleveland, Ohio, succeeding **J. S. Roscoe** who recently was made executive vice president in charge of business administration. **Norman Zollar** has assumed the responsibilities of purchase engineering, **Arthur Walper** will take over the duties of manager of Electrode Division purchases, and **William Toward** remains as manager of Machine Division purchases.

—o—

Dayton Supply & Tool Co., Inc., Dayton, Ohio, has been appointed a distributor for the Carboloy Department of General Electric Co., Detroit 32, Mich. The company will carry Carboloy's entire line of standard tools and blanks, masonry drills, and diamond wheel dressers.

—o—

George A. Gade, manager of outside sales for Standard Pressed Steel Co., Jenkintown, Pa., has been made vice president in charge of sales. Mr. Gade succeeds **J. Whiting Friel** who was elected vice president about a year ago.

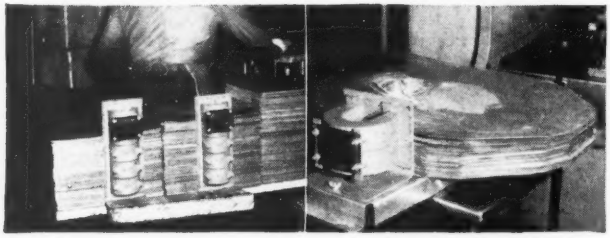
—o—

Norton Co., Worcester, Mass., has announced the appointment of **Alfred C. Womer** as field engineer in the Cleveland area. Mr. Womer recently completed a short course in Abrasive Division activities given by the company's sales training department.

SHEET STEEL HANDLING

can be fast and easy when you use

Verson SHEET FLOATERS



The Verson Sheet Floater eliminates the need for hand separation of sheets and blanks—the hard part of feeding sheet steel to presses, brakes, shears, etc. By magnetic action, the Sheet Floater forces the pieces apart—causes them to fan out for easy handling. This speeds up the feeding operations, reduces operator fatigue, and releases manpower for other jobs. Available in standard and heavy duty models for handling rectangular, round or irregular shaped pieces. Write for further information and prices.

A Verson Press for every job from 60 tons up.

Verson

VERSON ALLSTEEL PRESS CO.

9310 S. Kenwood Ave., Chicago 19, Ill. So. Lamar at Ledbetter Dr., Dallas, Tex.

How To Get More Production From Your Taps

Now you can get up to six times more production from taps used in your plant. This amazing increase in tap performance is made possible by a proven method of precision tap sharpening.

PRECISION TAP SHARPENING EXPLAINED

Precision sharpening consists of accurately grinding each tap to provide for uniform spacing of cutting edges, accurate hook angle on each cutting edge, and concentric chamfers. It makes possible an exact duplication of a previous grind.

THE BLAKE METHOD OF TAP SHARPENING

The only combination of machines on the market today which allows you to sharpen taps with this high degree of preciseness is the Blake Flute Grinder and the Blake Tap Chamfer Grinder. These two machines, used in conjunction with each other, enable you to get greatly increased production from your taps. They also help reduce tap breakage and increase effective tap life six times or more.



PRECISION SHARPENING IN OPERATION!

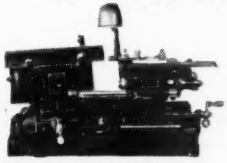
A ⅜"–24 four-fluted tap is ground accurately on chamfer with the No. 1 Blake Tap Chamfer Grinder.

SEND FOR COMPLETE INFORMATION

To get additional information on this subject, write to us for your free copy of the *Machinery* article, "Why Taps Should Be Sharpened Precisely". Technical details about both Blake tap sharpening machines are available in illustrated folders listed below. Ask for them!

IT'S A FACT! YOU CAN REDUCE YOUR TAP COSTS 50 to 75% by installing Blake tap sharpening equipment and sharpening your taps as you do other metal cutting tools.

PUT THIS COST-CUTTING COMBINATION TO WORK FOR YOU NOW!



BLAKE CHAMFER GRINDER
(Described in Bulletin 551)

+



BLAKE
FLUTE GRINDER
(Described in Bulletin 651)

=

ACCURATE, TRUE-CUTTING TAPS
LESS TAP BREAKAGE
600% MORE PRODUCTION PER TAP
UP TO 75% REDUCTION IN TAP COSTS

Write for details about both machines!

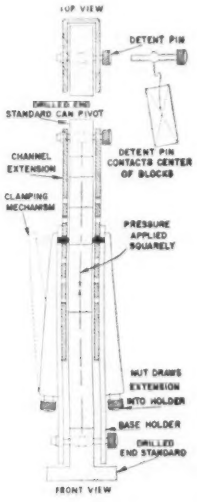
EDWARD BLAKE COMPANY 438 CHERRY ST., WEST NEWTON 65 MASSACHUSETTS

BLACK DIAMOND PRECISION DRILL GRINDERS...
WALTHAM CUTTER SHARPENERS...SURFACE FINISH STANDARDS

new shop equipment

Gage Block System Makes Gage Assembly Simple

Known as the DoAll Micro-Step Gaging System, a unique gaging development that is said to make it practical and feasible to use gage blocks directly in every day gaging and layout operations has been announced by The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill. The system is intended not only to speed up the construction of gaging setups with U. S. A. type gage blocks, but also to provide a means for realizing greater utility from gage blocks by permitting the construction of instruments for any gaging or scribing operation. While the various items in the system are available separately, each is designed to augment the use of the other items in conjunction with gage blocks, thus constituting a complete gaging system.



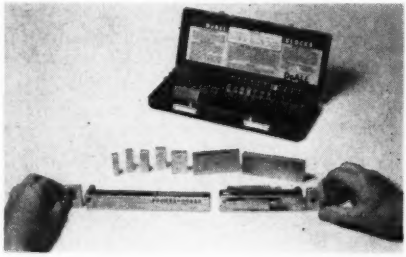
Demonstrating principle of gage assembly with gage blocks and the DoAll Micro-Step gage holder

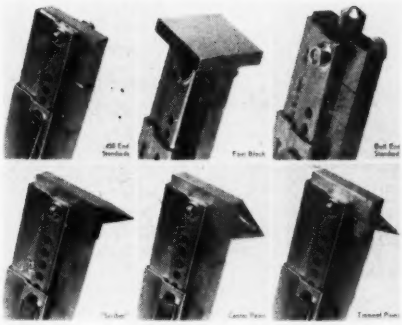
The nucleus of the system is a series of unique gage block holders and "end standards." The holders, it is claimed, permit setups up to 72 inches long in increments of as little as 0.000025 inch. The so-called "end standards" may be considered functional gage blocks. They incorporate the working surfaces needed for constructing measuring instruments. The holders, end standards, and gage blocks can be assembled easily, and the end standards can be fastened directly at the ends of the holders and, when so fastened, present a full uninterrupted surface beyond the ends of the holders, eliminating "end obstructions."

The holders are comprised of channel-type holders in graduated sizes which collectively embrace a usable measuring range of from 2 to 72 inches. A channel-type holder consists of a "channel extension" and a "base holder," the extension being designed to slip into the base holder.

A "captive" type detent pin is employed at each end of every extension, and the base holder and the end standards are

Assembling a height gage. The required end standards are fastened at the respective ends of the channel extension and base holder with detent pins. The extension is then slipped into the base holder.





Some of the end standards in the Micro-Step System. There are end standards for every conceivable gaging and layout operation. Note the completely exposed ends of these gaging pieces.

drilled to the diameter of this pin. In attaching an end standard, a standard is simply inserted in the holder at the desired end and its hole is aligned with the detent pin hole, after which the detent pin is pressed through the end standard to the opposite wall of the holder where it snaps into a lock bushing. The gage blocks required to complete the desired dimension between the working surfaces of the end standards are slipped into the holder and the entire assembly is clamped together with a thumbscrew mechanism located at the sides of the holder. The detent pin is said to assure positive contact between the components of the gage.

To clamp together the blocks and standards in a holder, the channel extension is drawn into the base holder by means of the thumbscrews at the sides of the base holder. The thumbscrews are on L-ended threaded rods, and the L-ends hook into holes in the side of the channel extension. When the rods are drawn down by the thumbscrews, the extension is drawn down also into the base holder. Because the end standards "float" on the detent pins, they are able to pivot, thereby adjusting to the parallelism of the gage block combination.

Some of the end standards include foot blocks, T-shaped blocks incorporating a large platform, which can be used as a small base block for constructing gages up to 25 inches in length; ball end standards which are blocks incorporating long-wearing sapphire ball points; knife-edge caliper bars which provide a means of checking concentricity of bores, and so on, when used at each end of a combination; and a base block which provides a stable base for unusually long combinations, including the maximum 72-inch combination. Also available in end standards are extension square-edge caliper bars, trammel points, center points, and scriber points.

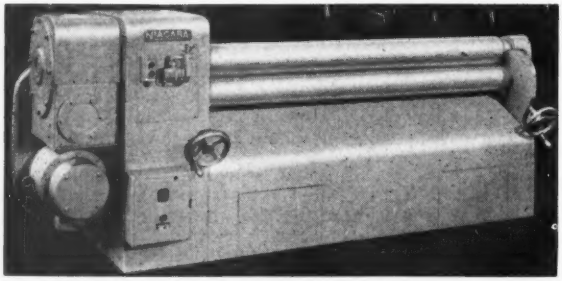
A precalibrated dial indicator set, consisting of a dial indicator, several calibrating blocks, and several brackets for attaching the indicator to a calibrating block, can be instantly calibrated and placed at the end of a holder as part of an indicating system. The mounting brackets permit the indicator to be mounted in various positions with relation to the holder, depending upon the requirements for checking the part under consideration.

The caliper holder constitutes a unique development in that the ends of the caliper arms carry detent pins for holding standards, such as caliper bars, ball, trammel or scriber points, or dial indicator, required for making caliper checks, scribing an arc, checking bores, and so on.

A heat-expansion calculator book, included with the system, speeds up and simplifies the selection of gage blocks for constructing a desired dimension, reducing figuring to a minimum. Height-combination tables list directly the blocks to be used in forming combinations for each dimension in the range of 0.0001 to 0.9999 inch in increments of 0.0001 inch. The Do-All Heat-Expansion Calculator, included in the book with the height-combination tables, provides the corrections that must be made in the heights of combinations used for checking parts other than steel at temperatures above or below the standard measuring temperature of 68 deg. Fahrenheit.

Assembled gage using knife-edge standards for checking concentricity of bores. Completely exposed surfaces permit checking of very deep bores.





Niagara All-Steel Bending Roll

Bending Roll Produces Commercially True Cylinders

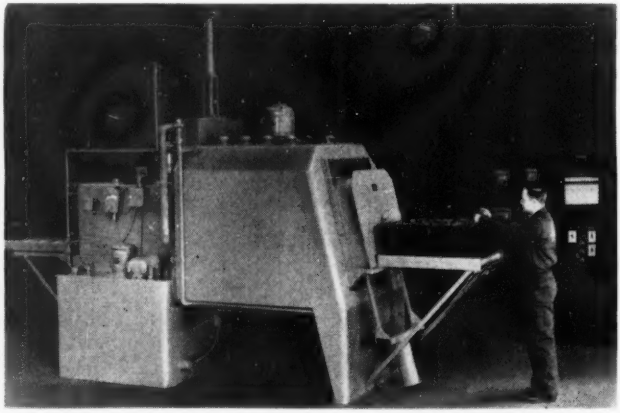
An all-steel bending roll which is said to produce commercially true cylinders from thinnest sheets to maximum capacity and which can roll a multitude of bends in various shapes has been announced by Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo 11, N. Y. The bending roll is of the pinch-type construction which is said to materially reduce flat spots on the leading and trailing edges of the work.

The machine incorporates three rolls which are power driven. An air-operated drop end is controlled by a two-station valve. The upper roll automatically tilts for easy removal of the rolled cylinder. Power adjustment for the rear roll allows the operator to quickly and easily move the roll to proper position for producing any desired radius of curvature, and roll position indicators permit speedy duplication of roll setting for repeat jobs. A magnetic brake on the main motor is said to prevent "drifting" of the work, permitting rapid reversal and positive jogging of rolls. The bending roll is available in three sizes with capacities of $\frac{5}{16}$ x 48 inches, $\frac{1}{2}$ x 72 inches, and 12 gauge x 120 inches.

Automatic Heat-Treating Unit

Designated as the T-400, a 400-lb./hr. automatic heat-treating unit which is said to have 100 per cent forced convection heating has been announced by Ipsen Industries, Inc., 721 S. Main Street, Rockford, Illinois. The unit is designed to operate at temperatures up to 1,850 deg. F. and has complete automatic straight-through operation from the heating through the cooling or oil quench operations. The unit is sealed to provide atmosphere control during the entire heating and quench cycle. The forced convection system utilizes non-alloy radiant-heating tubes, baffles, and a powerful fan mounted in the furnace roof. The tubes are designed for gas-fired or electric heating elements.

Work is loaded directly into the heating zone, and, after proper time at heat, the work tray is automatically transferred onto a quench-cool rack which holds the load for atmosphere cooling or lowers it for oil quench. The settings on the quench cycle timers automatically control the two-speed flow motors to provide any combination of drastic, moderate, or slow quench. The Model T-400 can be used to normalize, stress relieve, harden carburize, carbonitride, and braze and can be supplied with a special insulated tank for martempering or hot oil quenching.

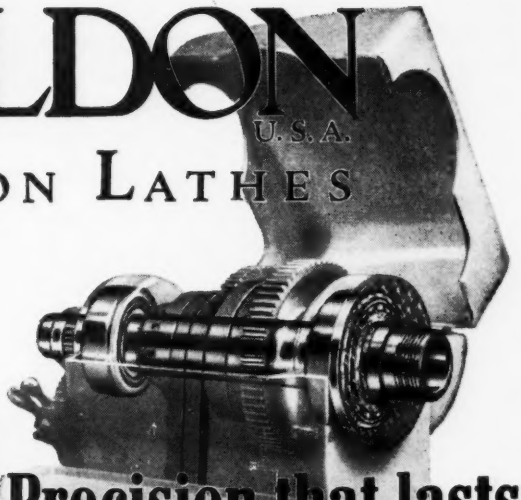


Ipsen Model T-400 Automatic Heat-Treating Unit

SHELDON

CHICAGO U.S.A.

PRECISION LATHES



Precision that lasts

. . . "ZERO PRECISION" TIMKEN TAPER ROLLER BEARINGS

No lathe can be more accurate than its spindle bearings. Hence before buying any lathe one should check the *exact* type and tolerances of bearings used.

The No. TS-56B (and several other) SHELDON Precision Lathes have Timken "Zero Precision" Taper Roller Bearings, held to tolerances of .00015". Not only are these the most accurate bearings used in any lathe, they are the sturdiest type . . . hold their accuracy thru long hard use . . . hold it even under abuse. With the other stamina features built into SHELDON Precision Lathes, they assure continued accuracy, without costly maintenance, thru years of hard service.

SHELDON "Stamina" Features:

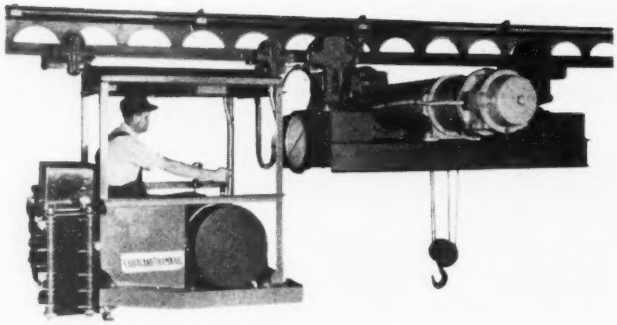
- Rigid, Heavily cross-strutted 1-piece Beds—2 V-ways, 2 Flat ways
- Full Double-Walled Aprons—all gear shafts supported on both ends.
- Heavy Carriage with wide bearing on bed.
- Twin V-Belts to Spindle for extra power.



Write for Catalog

SHELDON MACHINE CO., INC.

4250 N. Knox Ave., Chicago 41, Illinois



Tramrail Overhead Traveling Carrier

Overhead Carrier Features Hydraulic Cell Scale

Designed for weighing all loads handled up to 3 tons, an overhead traveling carrier which is equipped with a hydraulic cell scale has been announced by the Cleveland Tramrail Division of The Cleveland Crane & Engineering Co., 6405 E. 282nd St., Wickliffe, Ohio. The hydraulic cell is operated by a lever to which is fastened the upper hoist block. Resulting pressure is transmitted from the cell to the scale dial by hydraulic tubing. The scale weighs in pounds or kilograms, as desired. The motor-driven carrier has a travel speed of 300 f.p.m., and the hoist has a speed of 38 f.p.m. and a lift of 36 feet. Both travel and hoisting motors are provided with variable-speed controllers. The hoisting controller is also designed for dynamic lowering.

A safety switch is provided in the cab, and the travel motor is equipped with a foot-controlled electric brake. Also incorporated into the carrier is a weight-type limit switch which permits the operator to travel only when the load block is in high position, thus assuring clearance through openings of limited dimensions along the travel route. A screw-type limit switch is also provided for limiting the

CHICAGO

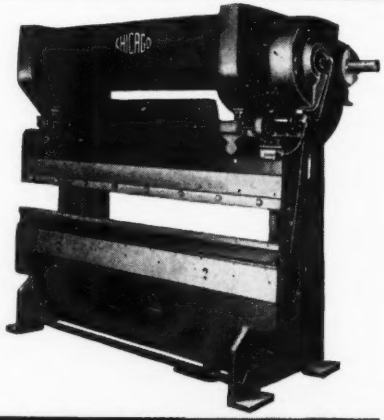
STEEL

PRESS BRAKES

43 Standard Sizes

Readily adapted for a wide variety of bending, forming, drawing, notching, blanking, punching, embossing, etc.

DIES Complete Line of Induction Hardened Dies for All Makes and Sizes of PRESS BRAKES.



DREIS & KRUMP MANUFACTURING COMPANY

7418 S. Loomis Boulevard, Chicago 36, Illinois

CHICAGO STEEL BENDING BRAKES BOX and PAN BRAKES PRESS BRAKES

Cleaner, Sharper Threads *Faster!...*

with PROCUNIER *Tapping Heads*

Procunier Tapping attachments have established a reputation for outstanding performance in the tapping industry. They have helped increase output capacity, and have reduced maintenance, operating and spoilage costs to a minimum. Developed by practical craftsmen—who have concentrated exclusively on developing, improving and perfecting tappers for more than 30 years — Procunier tappers offer the rare combination of high speed, dependable accuracy, lasting endurance and economy of operation. Special exclusive construction features enable them to cut threads *faster, for longer periods* —with fewer spoiled pieces, fewer rejects. Here's why:

1. **Tap breakage is practically eliminated** due to the high sensitivity of the new Procunier cork-faced friction clutch which automatically regulates driving pressure. Thus, even "green" operators can quickly detect dull or loaded taps by the "feel" or pressure on the clutch.
2. **Strain and wear are minimized** and tortion eliminated thru special gear reversing mechanism which distributes pull thru three intermediate gears.
3. Chuck spindle is supported at both ends assuring true operation—**avoiding tap wobble.**
4. **Aluminum housings** assure greater strength and rigidity with minimum weight—a vital factor for high speed tapping.
5. **PLUS** many other exclusive features.

WRITE TODAY for more complete details and specifications on the complete line of Procunier Tapping Heads and see why Procunier offers the "finest in tapping equipment."



The exclusive Procunier "Tru-Grip" tap holder is lighter, smaller in diameter. It affords easier tapping close to walls or shoulders, eliminates "chewed" tap shanks. Holds tap true.

PROCUNIER SAFETY CHUCK CO.
12 S. Clinton St., Chicago 6, Ill. Dept. 2

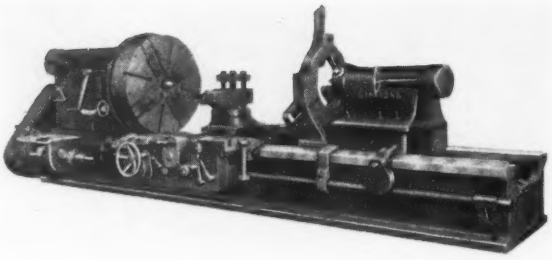
Gentlemen: Please send your illustrated brochure giving complete details, specifications and prices on the improved line of Procunier High Speed Tapping Heads.

Name .....
Address .....
City..... Zone... State.....

Procunier

Safety Chuck Company

12 S. CLINTON ST. CHICAGO 6, ILL.



Simmons Improved Extra-Heavy 48-Inch Engine Lathe

distance of travel when lowering. Variations of this unit can be supplied on special order to accommodate other loads, speeds, and lifting distances.

Heavy-Duty Engine Lathe Redesigned for More Power and Rigidity

Simmons Machine Tool Corp., 1745 N. Broadway, Albany 1, N. Y., announced that its extra-heavy 48-inch engine lathe has been redesigned for more power and rigidity and is now particularly well-suited for ordnance plants, shipyards, and other shops having heavy turning, facing, and threading operations. The bed length is available from a 20-foot minimum up to any length required, in 5 foot increments. The bed has an angular guide front way and is 46½ inches wide. The headstock is completely anti-friction with precision dual Timken bearings on the spindle. A variable voltage drive provides a wide range of spindle speeds with three gear changes, two through an internal faceplate drive and one direct to the spindle. Normal spindle speeds range from 1 to 144 revolutions per minute.

A completely new feed gearbox provides threads ranging from ½ to 56 per inch. The lead screw is now 3½ inches in diameter and the tailstock spindle has been increased to 7 inches in diameter. The improved lathe is available with a 54 or 60-inch swing and can be modified to meet special requirements.

COMET

BORING, FACING, and INTERNAL THREADING TOOLS

For holes from ⅛" upward, 15 different sizes

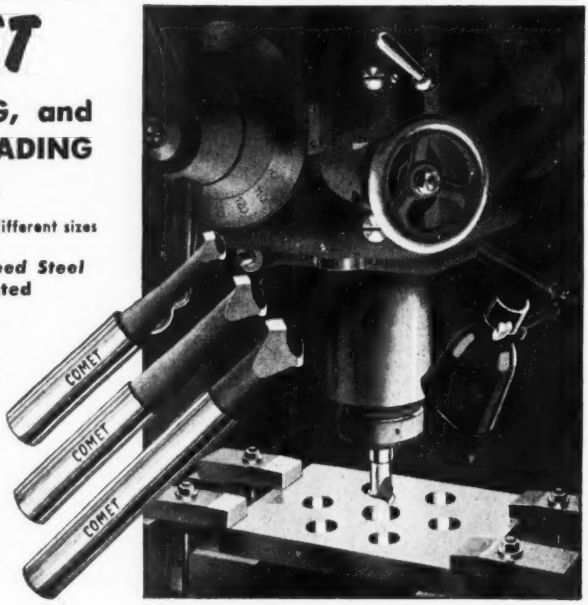
Made of Super-High-Speed Steel Specially Heat Treated

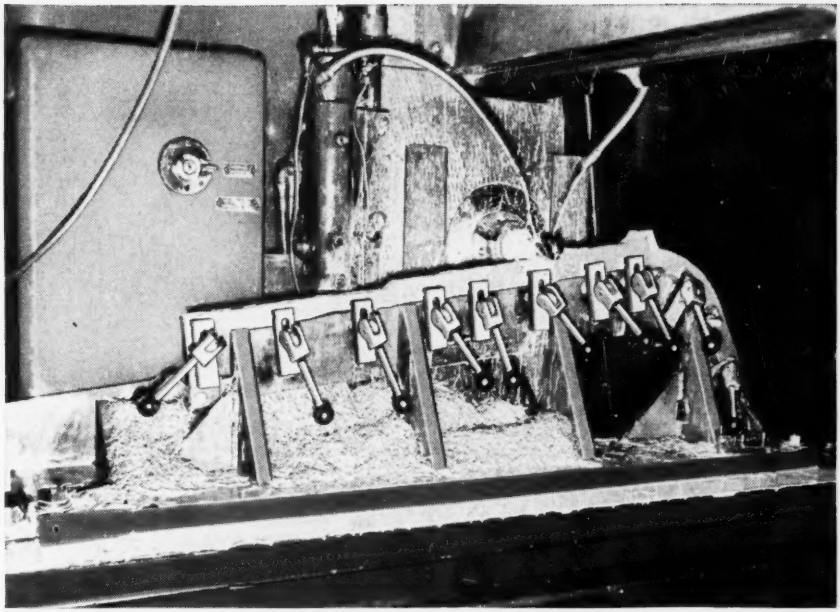
Indispensable for your JIG BORER. The worm-like spiral of the boring heads provides a long useful cutting surface. Their use insures perfect fitting threads. Correctly designed for precision work.

Write for complete data.

Comet Tool Co.

738 Broadway
New York 3, N. Y.





Airplane Canopy Bars Held Firmly by Wespo Cam Clamps for Contour Milling

This photo, taken in the plant of a leading airplane builder, illustrates the wide use of WESPO clamps by leading manufacturers in every phase of metal working, throughout the U.S.A.

WESPO clamps are made of top-quality materials, ruggedly constructed for heavy duty and long use. They are carefully engineered to meet the needs of a wide variety of work holding requirements. Made in 15 types and 100 sizes, there is a WESPO clamp to take care of almost every work holding operation. Also available are over 350 WESPO fixture parts.

Full scale template sheets will be sent on request.

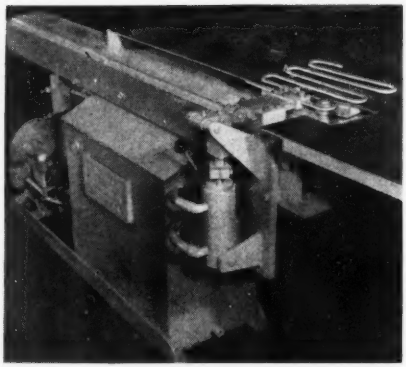
WESPO

WEST POINT MANUFACTURING CO.

26939 WEST SEVEN MILE ROAD • DETROIT 19, MICHIGAN

Semi-Automatic Machine Is Designed for Serpentine Coil Bending

Designed for serpentine coil bending operations, a semi-automatic bender which is equipped with a single control lever, stationary bending form, rotating wiping shoe, and semi-circular table to maintain long coils in a horizontal position during the sweep of the bending cycle has been announced by Pines Engineering Co., Inc., 642 Walnut St., Aurora, Ill. In bending serpentine coils, the first bend is completed in a conventional manner, after which the stock is rotated 180 degrees before clamping for succeeding bends. One movement of the operating lever initiates the entire clamping and bending cycle. The rotating wiping shoe is designed with a curved face and operates with a cam effect, thus allowing the operator to return the wiper immediately after completing the bend by reversing the operating lever.



View of Pines Semi-Automatic Bender, showing rotating wiping shoe at the end of bending cycle

The machine, it is claimed, can handle tubing up to 1 inch o.d., 16 gauge, and 5 feet in length. Die height of the machine from the floor is 35 inches, and overall dimensions of the base of the unit are 74½ x 15 inches. The unit is equipped with a Vickers self-contained power pack which is said to provide a bending speed of 29 r.p.m. A 3-h.p. motor is utilized and pump delivery is 7 g.p.m. at 1,000 lb. per square inch.

QUALITY ACCURACY COLLIS DURABILITY SERVICE

COLLET EQUIPMENT

Use-Em-Up Type Drill Sleeves
Use-Em-Up Type Drill Sockets
Standard Type Drill Sleeves
Standard Type Drill Sockets
Short Shank Type Sleeves
Short Shank Type Sockets
B. & S. Taper to B. & S. Taper Sleeves
B. & S. Taper to Standard Taper Sleeves
Standard Taper to B. & S. Taper Sleeves
Rough Shank Sockets
Solid Type Sockets
Morse Taper Shank Tap Sockets
Standard Spot Facing Cutter Bars
High Speed Point Lathe Centers
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Magic Type Chucks and Collets

Standard tools for all drilling, reaming, and tapping needs and special tools to order. Immediate attention to regular or special requirements.

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CLINTON, IOWA
Dept. A

CAMS

We are fully equipped to **GRIND** OR **MILL** a complete range of CAMS to your specifications on our **ROWBOTTOM** Cam Milling Machines.

Your inquiries answered promptly.

HIMOFF MACHINE CO., INC.
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CHUCKS THAT HAVE WHAT IT TAKES

and Yet Priced Unbelievably Low

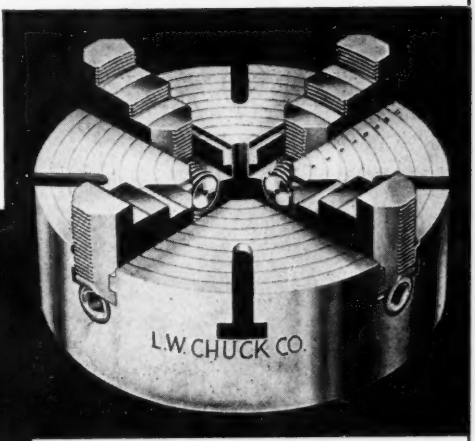
Our business has been built on selling fine chucks for less money!

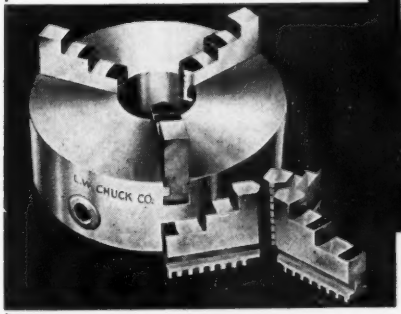
L-W 5" UNIVERSAL 3-JAW LATHE AND SCREW MACHINE CHUCK

AN UNBEATABLE VALUE AT ONLY.... $30.22

RUGGED • ACCURATE

Fits any lathe having 1½"-8 thread spindle. Using back adapter plate, it mounts on any size or type. Fits L-W 6½" SD Dividing Head. Three tough hardened steel pinions. Two sets of accurately cut hardened and ground steel reversible jaws. Cast semi-steel body ground to fine finish.





		Weight	Jaw Width
5"	$ 30.22	9 lbs.	½"
6¼"	$ 42.04	18 lbs.	¾"
7½"	$ 52.86	25 lbs.	¾"
10½"	$110.61	70 lbs.	1"

L-W 4-JAW CONVENTIONAL TYPE HEAVY DUTY INDEPENDENT LATHE CHUCKS

		Weight	Jaw Width
6"	$ 21.86	11½ lbs.	⅝"
8"	$ 27.41	20 lbs.	¾"
10"	$ 59.97	55 lbs.	1¼"
12"	$ 68.50	75 lbs.	1¼"
14"	$ 79.61	91 lbs.	1¼"
16"	$104.69	140 lbs.	1½"
18"	$137.96	160 lbs.	1½"

Order from Your Industrial Supply Distributor or Order Direct, Giving Name of Your Distributor.

Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products

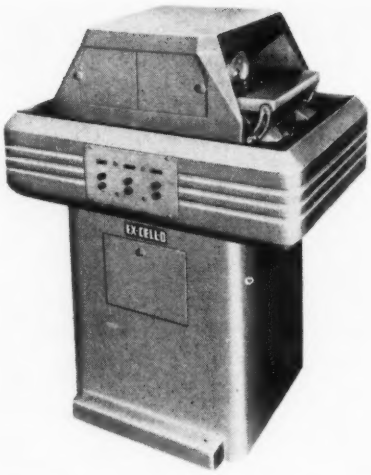


L-W CHUCK COMPANY

28 SO. ST. CLAIR ST.
TOLEDO 4, OHIO

Precision Tool Grinder Utilizes 6-Inch Cup-Type Wheels

Designated as the Style 44-A, a precision tool grinder which utilizes 6-inch cup-type wheels and which can sharpen a wide variety of tool materials, such as sintered carbides, cast alloys, and high-speed steels, is now being manufactured by Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. According to the manufacturer, the machine is especially suitable for grinding carbide with diamond wheels and is capable of sharpening all sizes of boring, turning, and facing tools up to ⅝ inch square or equal cross-sectional area.



Ex-Cell-O Style 44-A Precision Tool Grinder

The grinder features a heavy steel base, large U-shaped rigidly-supported tool rest tables, and hardened steel wear plates. The tables can be easily tilted to the exact angle required, the adjustment being shown on a degree scale. A reversible motor is said to permit left and right-hand tools to be ground on the same wheel. The wheel spindle is driven by a balanced inbuilt motor, and the spindle shaft is mounted in ball bearings of the combination radial and thrust type.

RIVETING?

for

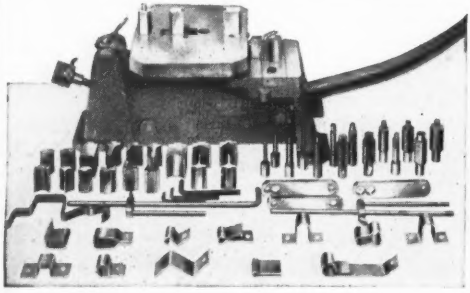
FAST RIVETING
WITHOUT NOISE



Put your production jobs on Linley Spinner Type Riveting Machines. No hammering! They spin rivet with twin rollers. In most cases the actual riveting time is one second per rivet, so that you can watch costs come down while noise is entirely eliminated! Direct Motor or Vee-Belt Driven. Bench or floor types.

Send samples of your work for free riveting, cost of equipment and true estimate on production.

LINLEY BROTHERS CO.
671 STATE ST. EXT. BRIDGEPORT 1, CONN.



Multiform

BENDER CUTTER

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds Into Any Shape, Clamps, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, Steel Rule Dies, Etc.

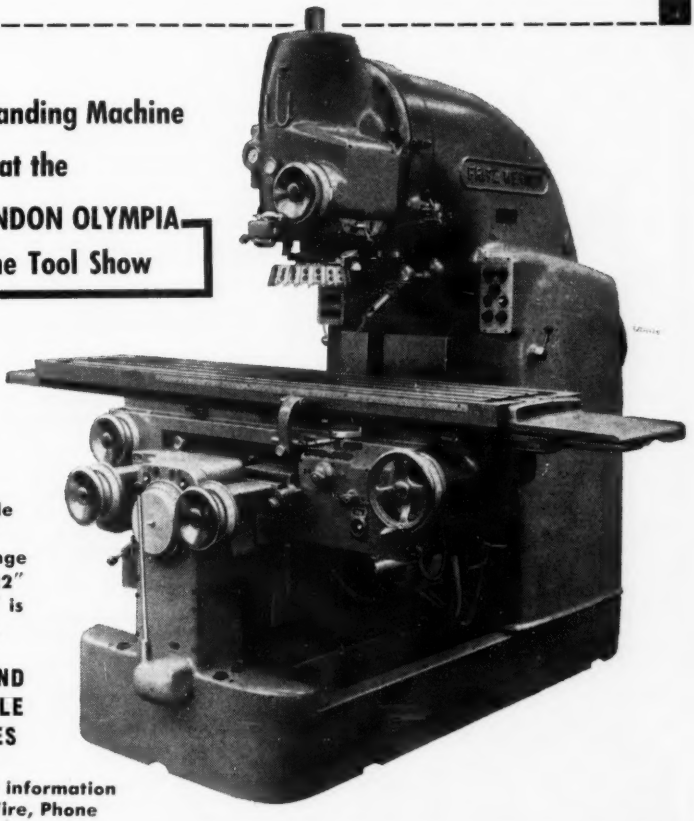
AIR OR HAND MODELS FOR UP TO ¼" to 4" MATERIAL

Write for brochure which illustrates and describes the four bender models.

J. A. RICHARDS CO.
Dept. 6 M Kalamazoo, Mich.

THE WERNER No. 5
VERTICAL MILLER

The Outstanding Machine at the 1952 LONDON OLYMPIA Machine Tool Show



Size of table 20"x19" Complete range from 6¼"x22" to 20"x90" is available.

PROMPT AND REASONABLE DELIVERIES

For further information Write, Wire, Phone

MARAC MACHINERY CORP., 1819 Broadway, N. Y. 23 • CI 7-2048

Portable Power Drill Is Designed for Heavy and Light-Duty Jobs

Designated as the MallDrill Model 127, a portable power drill which is housed in lightweight aluminum alloy and is designed for both heavy and light-duty operations has been announced by Mall Tool Co., 7814 S. Chicago Ave., Chicago 19, Ill. The unit incorporates a universal a.c.-d.c. motor, hardened heavy pitched gears, self-lubricating bearings, geared chuck, built-in trigger-type switch, and contoured bar handles and is said to provide a spindle speed of 500 revolutions per minute.



MallDrill Model 127 Portable Power Drill

The MallDrill Model 127 is equipped with a 10-foot 3-conductor rubber-covered cord and plug for performing drilling and grinding operations. For polishing and sanding operations, the drill is available without a geared chuck but with a 7-inch backing pad, 7-inch sheep wool bonnet, 3 assorted abrasive discs, and an adapter. In this case, the tool is designated as the Model 127PS.

Collet Pad

Designated as the Universal No. 3, a collet pad which is designed for use with the Hall Model B 2-Inch Collet Chuck and is said to fit any standard make master collets made for a No. 3 collet pad has been announced by Hall Mfg. Co., Dept. B, 622 Tularosa Drive, Los Angeles 26, Calif. All parts in the pad are hardened and ground with a special black oxide finish to prevent rusting.

The Hall Universal No. 3 Collet Pad is available in round sizes ranging from $\frac{1}{16}$ to 1-17/32 inches in increments of $\frac{1}{32}$ inch,



WHITNEY
No. 91
Bench Punch

A very efficient and satisfactory tool for general use, shop or experimental room.

Depth of throat — 5 inches.

Capacity — ½ thru ¼ or 2 thru ⅛".

Notches angles 1½ x 1½ x ⅛.

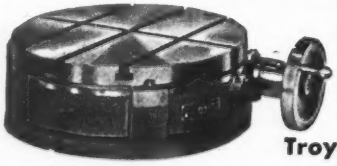
Punches supplied in rounds, squares, ovals, rectangles or specials. Especially adaptable for experimental work. Also made in 10", 18" and 24" depth of throat.

Write for catalogue.

W. A. Whitney Mfg. Co.

640 Race St. Rockford, Ill.

PRODUCTION INCREASES...
***with* TROYKE ROTARY TABLES**



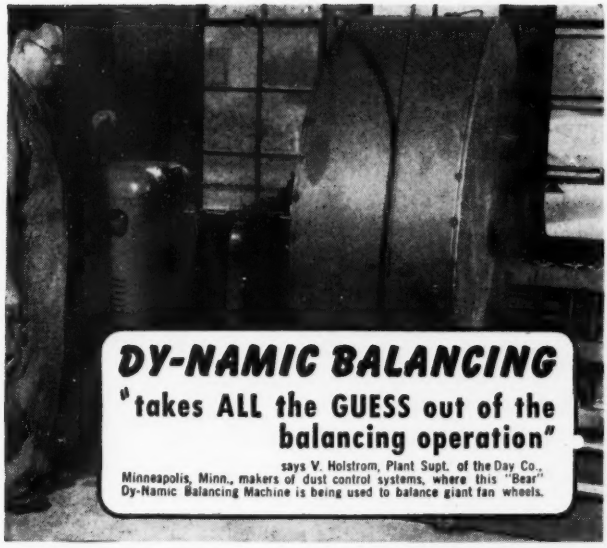


Sizes:
9 - 12 - 15 - 18 - 21 - 25.

See your dealer or write for Catalog No. 17, fully illustrated, showing all models and applications to various work.

Dividing Attachments can be furnished for all models of Wormwheel operated Rotary Tables except the Model BH-9.

Troyke Mfg. Co., Cincinnati 9, Ohio, U. S. A.



SIMPLIFIED OPERATION of "Bear" Dy-Namic Balancing Machines is so fast, so economical, so easy to learn that manufacturers, maintenance shops and others are employing this revolutionary method with top-production results. No complicated manipulations to learn! Average shop man can learn to balance in a few hours! Get full details by sending for **FREE DY-NAMIC BALANCING MANUAL** ... tells how you can eliminate noise and vibration, reduce wear and improve performance of rotating parts, *quickly, accurately,* and *economically.* Write: Bear Mfg. Co., Dept. **M25**, Rock Island, Ill.

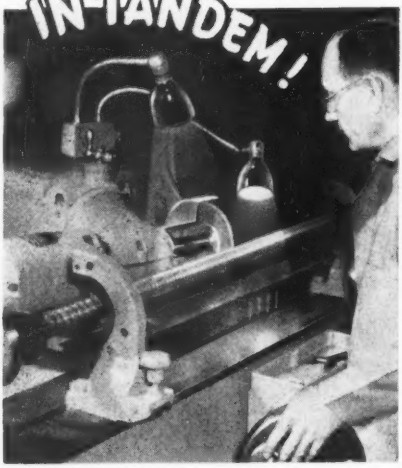
6040

"BEAR"

STATIC AND *DY-NAMIC BALANCING* MACHINES

balance rotating parts weighing from 4 oz. to 8 tons

"AMERICAN BROACH"
INSTALLS
VIMCO Light
IN TANDEM!



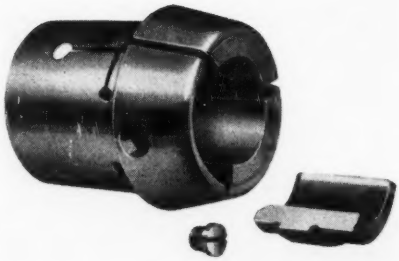
VIMCOLIGHTS in tandem are the one-two punch that help keep tip-top *accuracy* and peak *production* all shift long for this high precision broach sharpener of the American Broach & Machine Company. There's no fall off of workers' efficiency. Operators work more comfortably . . . produce better and more accurately.

You sell your machine on the basis of performance . . . keep it performing well . . . install Vimcolights as original equipment. Write for Bulletin 74.



SEE BETTER . . .
WORK BETTER

VIMCO MFG. CO., Inc.
SINCE 1919
111 Brayton Street, Buffalo 13, N. Y.



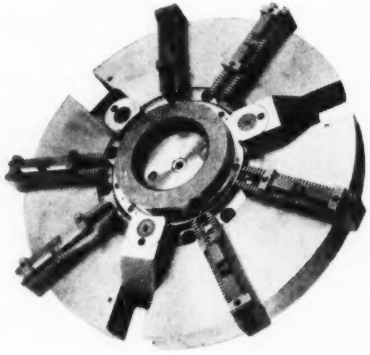
Hall Universal No. 3 Collet Pads and Master Collet

in hexagon sizes from $\frac{1}{16}$ to 1 inch in increments of $\frac{1}{16}$ inch, and in square sizes from $\frac{5}{16}$ to $\frac{1}{2}$ inch in increments of $\frac{1}{16}$ inch.

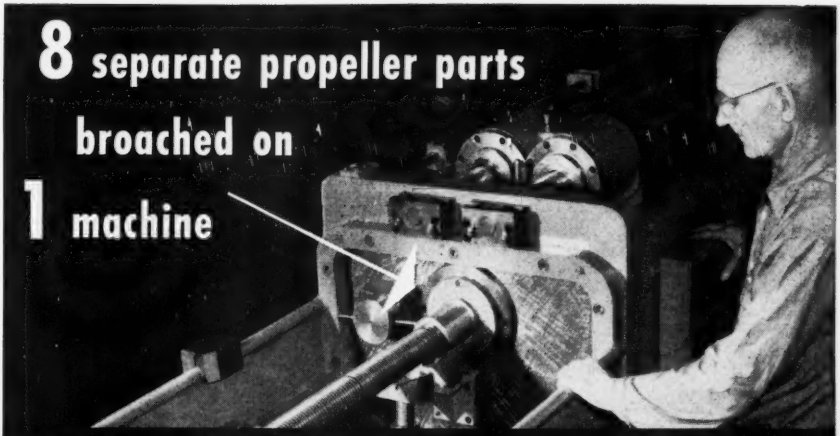
Chuck Designed for Turbine Wheel Machining

Large turbine wheels and jet engine discs and rings can, it is claimed, be safely machined without fear of distortion or strain when held in a chuck which is now being manufactured by Cushman Chuck Co., Hartford 2, Conn. According to the manufacturer, the chuck meets the requirements of rigidly holding large workpieces of small cross section without the usual distortion, strain, or harmonic vibration encountered when machined at high speeds. The chuck can be furnished on special order for either manual chucking or air-power chucking for repetitive machining operations.

Cushman Turbine Wheel Chuck

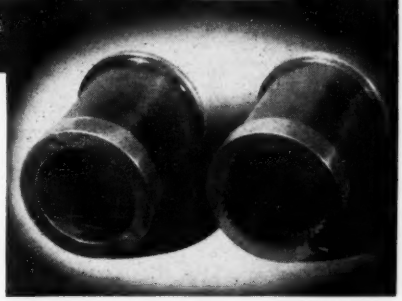


8 separate propeller parts broached on 1 machine



A PROPELLER MANUFACTURER GOT THESE BENEFITS FROM HIS AMERICAN HORIZONTAL MACHINE:

1. Tooling is readily inter-changeable for eight separate parts of short run production.
2. Large parts are easily loaded and unloaded.
3. Double helical drive for right and left hand helix readily adaptable to machine.
4. The horizontal machine provided the most tonnage and stroke per dollar invested.



To broach the propeller sleeve gears, American built and equipped a standard HDE-30-72 horizontal broaching machine with six interchangeable lead bars for different internal spline operations. The machine broaches eight different propeller sleeve gears.

Number of spline teeth vary from 43 to 55 with diameters ranging from 2¾" to 3½", and with length of splines cut ranging from ¾" to 3" long. Ask American which type of machine best suits your requirements. Just send a part print and hourly requirements for our recommendations.

AMERICAN *American* BROACH & MACHINE CO.
A DIVISION OF SUNDSTRAND MACHINE TOOL CO.
ANN ARBOR, MICHIGAN

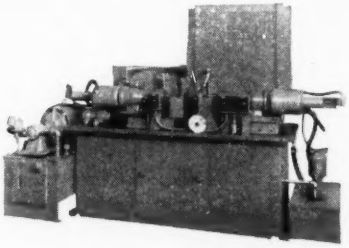
SUNDSTRAND

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

Machine Automatically Drills and Deburrs Six Holes in Steel Disc

An electrically-interlocked machine which is designed to drill and deburr six holes in a steel disc at the rate of approximately 260 pieces per hour has been announced by Govro-Nelson Co., 1933 Antoinette, Detroit 8, Mich. The machine incorporates two Govro-Nelson automatic drilling units, each equipped with a 6-spindle multiple head.

In operation, the operator loads the part on a locator and presses a starting switch, causing the part to be automatically clamped. One unit then feeds in automatically to drill six $\frac{5}{16}$-inch diameter holes, whereupon the second unit feeds



Govro-Nelson Interlocked Drilling and Deburring Machine

in automatically from the opposite side to deburr the six holes. When the deburring unit completes its operation, the part is automatically unclamped so that the machine is ready for reloading by the operator.

By using different multiple heads, the machine, it is claimed, can readily be adapted to other drilling and deburring operations.



Rotary Table Is Designed for Mounting Small Precision Work

A rotary table which is designed for mounting small precision work and which can be used on a drill press, milling machine, shaper, or surface grinder has been announced by South Bend Lathe Works, South Bend 22, Ind. The precision-ground work table measures 4½ inches in diameter and is provided with three T-slots for clamping the work.

The table is rotated by worm gearing having a graduated collar and ball crank. Each graduation indicates a table move-

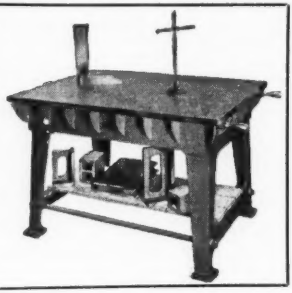
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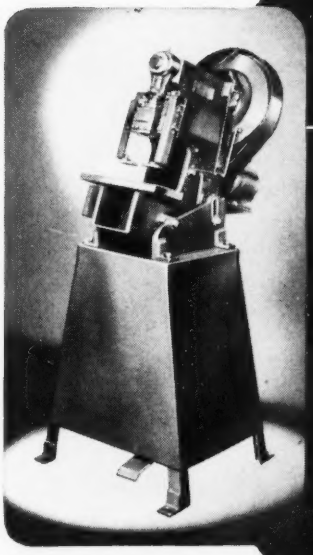
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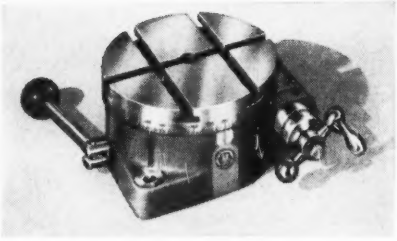


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South Bend Rotary Table

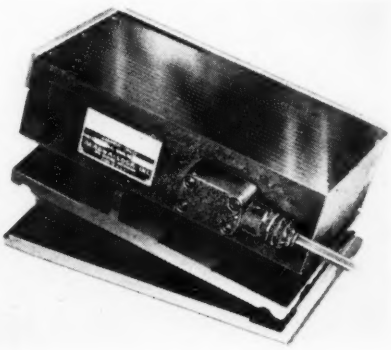
ment of three minutes, and one complete revolution of the ball crank turns the table five degrees. A small knurled thumbscrew permits easy resetting of the graduated collar to zero. The edge of the table is graduated 360 degrees, and a handy clamping lever locks the table in any position. Eight work-clamping bolts with nuts and washers are supplied.

Sine Chuck Simplifies Angular Surface Grinding Setups

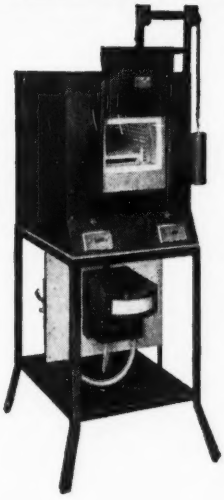
Magna-Lock, Inc., Dept. 1150, Big Rapids, Mich., has announced a magnetic sine chuck which is designed to simplify angular surface grinding setups. Standard gage blocks are utilized to ensure maximum accuracy. The gage blocks required for a particular single-angle or compound-angle setup can be quickly determined by using a table of constants which is furnished with each chuck.

The powerful magnetic attraction of the sine, it is claimed, holds the work securely during the grinding operation, minimizing distortion or warpage.

Magna-Lock Sine Chuck



PRODUCTION *RUGGEDNESS!* } HUPPERT
LABORATORY *ACCURACY!* } Model 11 FM FURNACE



Consistent temperature - controlled heat output of this heavy-duty electric furnace has found wide acceptance in the tool and die industry. Laboratories too have found trouble-free operation and close temperature control a great asset to their closely budgeted operations. This dependable furnace features — special alloy elements, fully enclosed contracts, snug fitting counterbalanced sliding door, °F. or °C. pyrometer and removable porcelain tray. Model 11 FM is available in 220 volt A.C., single phase, max. load is 4 KW., maximum temperature range — 2000° F. The inside dimensions measure 8" wide by 6" high by 12" deep. The stand is fabricated of 1½" x 1½" x ⅛" angle iron and finished with two coats of black krinkle finish. A convenient service shelf is 12" above the floor.

Complete with automatic temperature control $490.00

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Model No.	Inside Dimensions	Max. Temp.	KW	Price
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Manufacturers of Electric Furnaces and Ovens

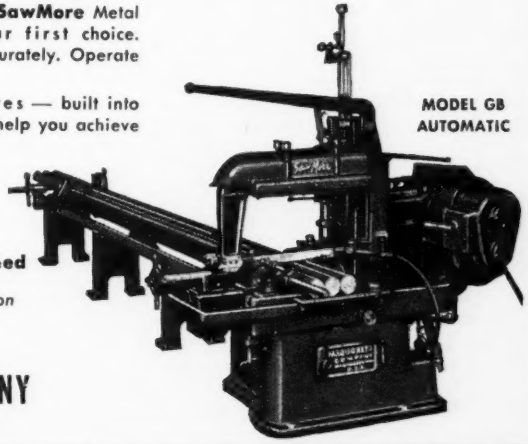
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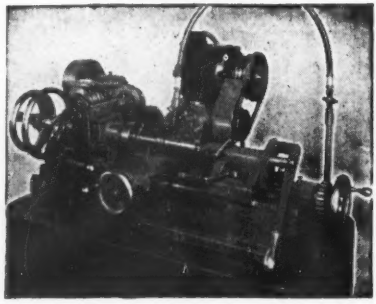
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THREAD MILLING MACHINE

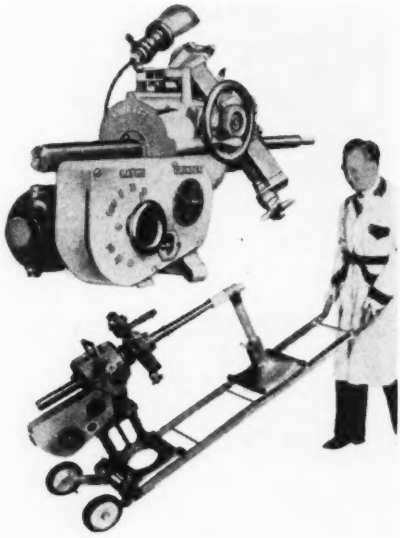
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WALTHAM MACHINE WORKS
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Portable Lathe Has Speeds From 0 to 45 R.P.M.

Designated as the Model B-23, a self-contained portable lathe featuring 10 speeds ranging from 0 to 45 r.p.m. which are rheostat controlled by a dial has been announced by Barrett Equipment Co., Industrial Division, 2101 Cass Ave., St. Louis 6, Mo. The lathe is said to be semi-automatic in operation after the initial simple setup is made, and infinite feed controls and other features can be adjusted quickly and easily while the lathe is in operation.



Barrett Model B-23 Portable Lathe

The portable lathe head travels as it revolves on a boring bar arbor. The tool arm, adjustable for diameters from 7½ to 20 inches, remains fixed in relation to the head. The speeds and feeds of the machine are said to be limited only by the material of the workpiece and the cutter which may be either high-speed steel or carbide.

The design of the lathe is said to permit either the external or internal machining of a circular workpiece, up to 20 inches in diameter, by simply reversing the toolholder and installing the correct type of cutting tool.

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with its POROUS METAL BOND

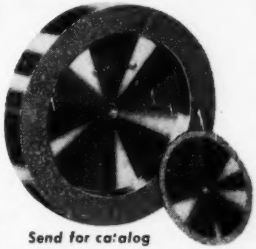
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- FAST RATE OF CUT
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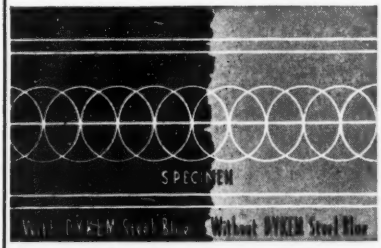
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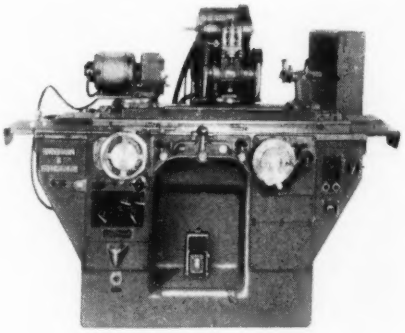
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Grinding Machine Features Completely Universal Wheel Spindle Unit

A grinding machine featuring a completely universal wheel spindle unit which permits either the external or the internal grinding spindle to be used in any desired horizontal position has been announced by Brown & Sharpe Mfg. Co., Providence 1, R. I. The wheel spindle unit incorporates a universal turret in which the upper members of the unit rest. The machine also features a hydraulic table drive which provides smooth table movement with speeds infinitely variable from 3 to 150 inches per minute; easily removable tanks for hydraulic and coolant systems; fine cross feed adjustment to 0.0001 inch on work diameter; and positive stops on cross-feed for either external or internal grinding.

The machine is available in four models; namely, the No. 1, No. 2, No. 3, and No. 4. The No. 1 has practical wheel speeds of 2,500, 3,000, and 3,600 r.p.m.; an internal grinding spindle for 16,500, 24,000, or 35,000 r.p.m.; and a nominal distance between centers of 20 inches. The No. 2 No. 3, and No. 4 each have practical wheel speeds of 1,600, 2,000, and 2,400 r.p.m. and an internal grinding spindle for 12,500, 16,500, 24,000, or 35,000 r.p.m., with nominal distances between centers of 30 inches, 40 inches and 60 inches respectively.



Brown & Sharpe No. 1 Universal Grinding Machine

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For Tools and Small Parts

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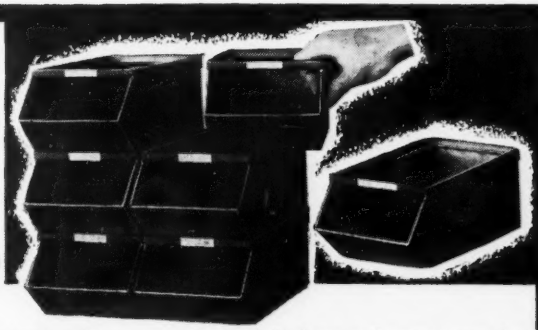
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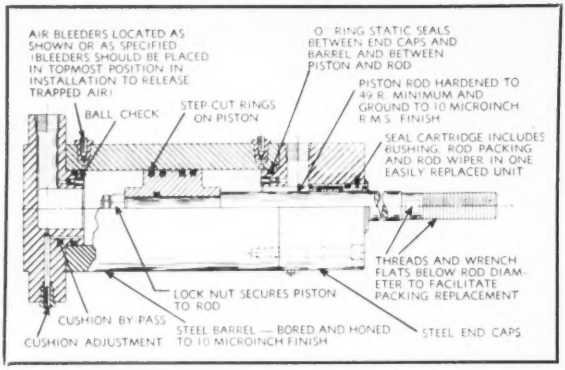
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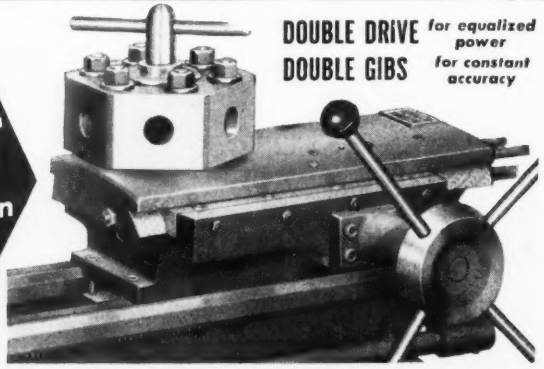
Cutaway view of Hydro-Line Series "J" Hydraulic Cylinder

Cylinder Features All-Steel Body and Bored Barrel

Designated as the Series "J," a hydraulic cylinder which features an all-steel body, bored barrel, hardened piston rod, rod scrapers, and cartridge-type packings has been announced by Hydro-Line Mfg. Co., 743 19th St., Rockford, Ill. The unit is said to comply with J. I. C. specifications and is designed for working pressures up to 2,000 p.s.i. According to the manufacturer, the score-resistant hardened piston rod and gland packing, protected by rod scrapers, assure long service life in foundries and mills processing steel, rubber and ceramics where abrasive dusts can not be avoided.

Fabricated steel end caps and heavy-wall steel tubing combine, it is claimed, to make the cylinder body unusually resistant to damage by rough handling. Barrels are bored before honing to ensure precise piston ring fit for full length of the stroke. The cylinder is available for oil or water hydraulic service in bore sizes up to 10 inches in diameter.

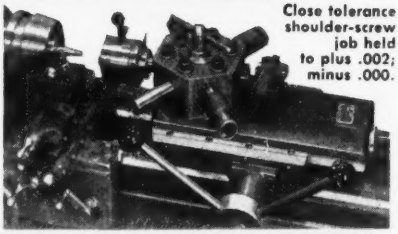
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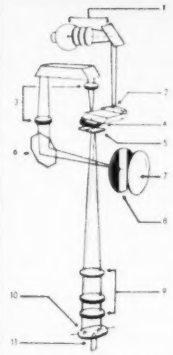


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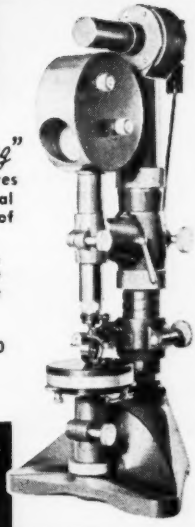
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This LEITZ ORTHOMETER speeds up inspection, allows more than one person to view scale simultaneously. The only moving parts are the contact tip and mirror.

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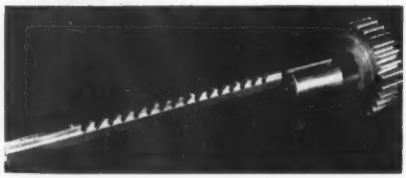
9312 SANTA MONICA BLVD. • BEVERLY HILLS, CALIF.

Keyway Broach Features New Tooth Form

The du Mont Corp., Greenfield, Mass., has developed a new tooth form which is now being incorporated in all of its "Minute Man" Keyway Broaches. According to the manufacturer, the new form provides for maximum chip room, assures efficient curling of the chips, and prevents clogging or wadding. The new tooth form is available in all the broach sizes from $\frac{1}{16}$ to 1 inch.



(Left) Drawing showing improved tooth form of du Mont "Minute Man" Keyway Broach



(Below) Overall view of du Mont "Minute Man" Keyway Broach incorporating new tooth form

Portable-Electric Tool Is Designed for High-Speed Preparation and Finishing Operations

Designated as the Diskette Model B-2, a portable-electric hand tool designed for high-speed grinding, filing, deburring, sharpening, sanding, polishing, and other preparation and finishing operations has been announced by Franklin Balmar Corp., Baltimore 11, Md. Since the unit operates at high speeds, its capacity is limited to a 4-inch disc. The tool incorporates high-grade ball bearings, an aluminum air intake cover located at the base of the tool, and a double cooling fan for maximum cooling efficiency. A universal motor for 110-120 volts, a.c. or d.c. current, is said to afford the spindle shaft a no-load speed of approximately 9,000 revolutions per minute.

According to the manufacturer, the Diskette Model B-2 also incorporates a collet chuck in the spindle for various attachments, thus reducing the overhang on certain attachments, assuring accur-

Chicago MOUNTED Wheels



...now even better with 79E BOND

the new miracle grinding wheel bond

Greatest selection of sizes and shapes for every application. Best of all, deliveries are good . . . ready when you need them.

Try Chicago Mounted Wheels—bonded with 79E Bond—and you'll never buy any other! This tough new grinding wheel bond, exclusive with Chicago Wheel, has taken the industrial world virtually by storm, doing a better grinding job faster.

CHICAGO WHEEL & Mfg. Co.
Dept. MMS, 1101 West Monroe Street, Chicago 7



IMMEDIATE SHIPMENT

STYLE 700 STACKING BIN

ALL PRICES F. O. B. FACTORY PHILA.

—

COMPLETE CATALOG ON REQUEST

A light weight box designed for quick identification of contents. Drop handle on back of bin. Will stack with style 300 stacking box of same length and width. Other styles and sizes available.

Product Number	Width	Length	Height	Gauge Steel	Price Plain	Price Green
703-19	9"	13½"	4½"	19	$1.38	$1.55

PHONE • WIRE • WRITE

BAldwin 9-1805

BAY PRODUCTS, INC., 3015 N. 16TH ST.

PHILADELPHIA 32, PA.

"Best Buy" PRECISION-MADE MICROMETER

Check These IMPORTANT ADVANTAGES

- FORGED FRAME
- ONE-PIECE HARDENED STAINLESS STEEL SPINDLE
- Heavy Duty TUNGSTEN CARBIDE measuring faces
- Clean, easy-to-read graduations
- Quick acting, positive lock — will not move spindle off its center
- Narrow anvil facilitates measurements in tight places
- Light touch friction stop —sensitive "feel"
- Temperature insulating plastic faces on frame

ASK YOUR DEALER or write



No. 23c

READS TO .0001"

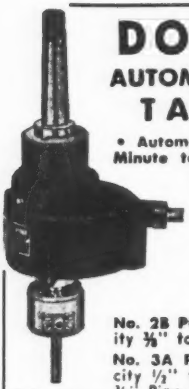
$18.75

F.O.B. N.Y.

FULLY GUARANTEED

ETALON

ALINA CORPORATION • 401 Broadway, New York 13, N. Y.



DORMAN
AUTOMATIC REVERSE TAPPERS

- Automatic Torque Control, One Minute to Adjust, Prevents Tap Breakage, Operator Need Not Be Skilled.
- WIDE RANGE TAP CAPACITY.

No. 1A FRICTION DRIVE TAPPER—capacity No. 2-56 to ⅜" in Steel—½" in Aluminum.

No. 2B POSITIVE TAPPER—capacity ⅜" to ⅞" in Steel.

No. 3A POSITIVE TAPPER—capacity ½" to 1¼" in Steel—½" to ¾" Pipe Taps.

No. 4A TAPPER — capacity ¾" to 2" in Steel including Pipe Taps.

- PRODUCTION THREADERS with Round Split . . . Button . . . Acorn Dies.

Priced from $48.00
Write for Bulletin
IMMEDIATE DELIVERY

THRIFTMASTER PRODUCTS CORPORATION
Division of Thomson Industries, Inc.
1034 N. PLUM STREET, LANCASTER, PA.
STANDARD UNIVERSAL ADJUSTABLE AND SPECIAL FIXED CENTER DRILLHEADS

Carbide Tipped Tools *Work Better* in a
Clark ADJUSTABLE TOOL HOLDER



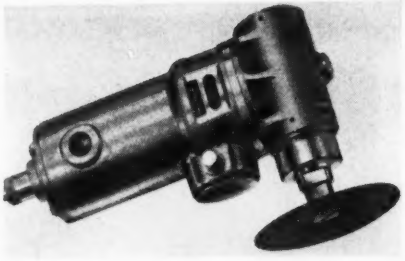
Exclusive vise grip jaw runs full length of cutting channel . . . hugs bit so it can't rock, chatter, slip, sag or break . . . *permits faster feed, deeper cuts!* Holds all sizes—square, round, undersize or narrow bits for cutting off or special forming operations.

Also available with 15° cutter channel for H.S.S. tool bits.

For complete information call your Clark Cutter Jobber now or write Factory B

ROBERT H. CLARK COMPANY
9330 Santa Monica Blvd. • Beverly Hills, Calif.

Manufacturers of Precision Cutting Tools



Diskette Model B-2 Portable-Electric Hand Tool

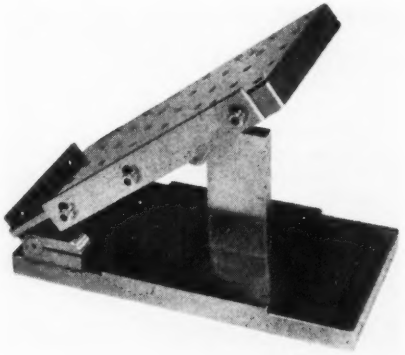
ate centering of any attachment, and minimizing vibration during use. A special threaded adapter collet is available for use with composition discs.

Sine Plate Accurate within 0.00015 Inch in Flatness and Squareness

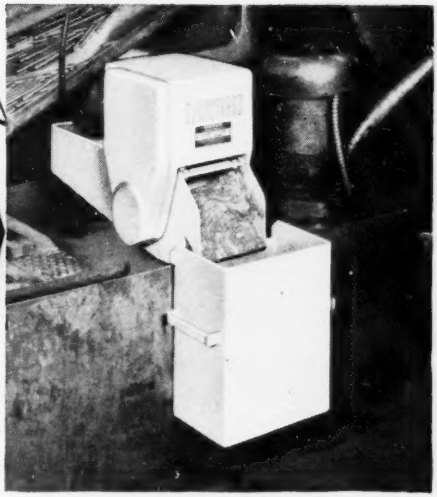
Tool Specialties Co., 390 Hillside Ave., Hillside, N. J., has announced a precision 5-inch sine plate which is said to be accurate within 0.00015 inch in flatness and squareness. The sine plate is made of hardened and ground tool steel, has a height of 1½ inches when flat, and allows a maximum range up to 90 degrees when in angular position.

The sine table has an extra-large clamping surface measuring 4 inches wide x 7¾ inches long with tapped holes spaced ¾ x 1 inch apart. The base plate has a 0.1-inch recess to permit any sine above zero, set up with gage blocks according to the Table of Constants.

Precision 5-Inch Sine Plate

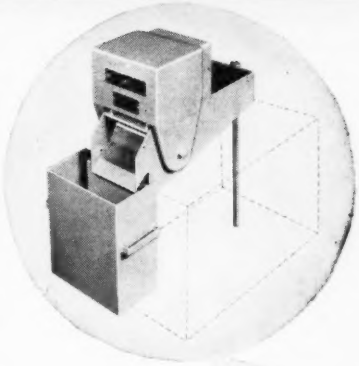


$1927.12 SAVED PER YEAR



...with Sundstrand Magnetic Coolant Separator

Installation of a Sundstrand Magnetic Coolant Separator on a grinder, as shown above, resulted in a yearly saving of $1927.12. Further, instead of cleaning the coolant tank twice daily, it now requires cleaning only *twice weekly.* Cost of the installation is approximately $475.00. The unit requires no attention and little or no maintenance.



Easily Installed Without Additional Piping.....

An important feature of this magnetic coolant separator is that it can be dropped into position on most open type coolant tanks. No additional piping is required. Install one on your present equipment and compare its efficient operation with other units.



Free Additional Data

This folder will give you the complete facts on the Sundstrand Magnetic Coolant Separator. Write for your copy today. Ask for bulletin 528-M.

SUNDSTRAND POWER-GRIP

SUNDSTRAND
Magnetic Products Co.
Division of Sundstrand Machine Tool Co.
1020-9th ST. • ROCKFORD, ILLINOIS

New Counterbore

with interchangeable pilots



Photograph by Morton Berger

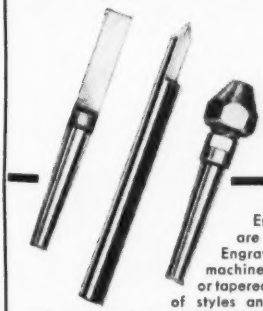
Introducing the Butterfield High Speed Counterbore and Spot Facer in standard and aircraft designs . . . latest example of Butterfield craftsmanship. *Ask your distributor.*

BUTTERFIELD

Union Twist Drill Company ***Butterfield Division*** *Derby Line, Vermont, U. S. A.*

DRILLS • TAPS • DIES • REAMERS • COUNTERBORES • SCREW PLATES

ENGRAVING CUTTERS



for

- STEEL
- METAL
- PLASTIC

PREIS-PANTO Engraving Cutters are for use in any Engraving or Routing machine requiring straight or tapered shanks. A variety of styles and a quality for each purpose is available. Made by the makers of a full line of Engraving Machines and Accessories.

PANTO

Write for Price List No. 44

H. P. PREIS ENGRAVING MACHINE CO.
657 Route 29, Hillside, N. J.

Over 85% of the torque wrenches used in industry are

STURTEVANT TORQUE WRENCHES

Read by Sight, Sound or Feel

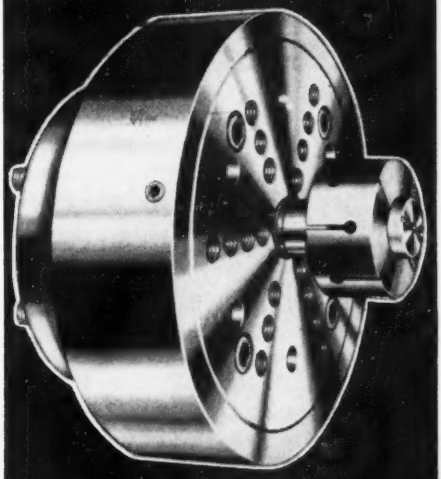
- Permanently Accurate
- Practically Indestructible
- Faster—Easier to use
- Automatic Release
- All Capacities

in inch ounces
...inch pounds
...foot pounds
(All sizes from 0-4000 ft. lbs.)



Every manufacturer, design and production man should have this valuable data. Sent upon request.

P.A. STURTEVANT CO
ADDISON [QUALITY] ILLINOIS



9 Reasons for You to get the Facts on SPEEDGRIP CHUCKS

1. They increase production.
2. They give greater accuracy.
3. Set-up time is shorter.
4. They are safer to operate.
5. First cost is low.
6. Maintenance cost is low.
7. Design is simple.
8. Guaranteed to do the job.
9. Service is prompt.

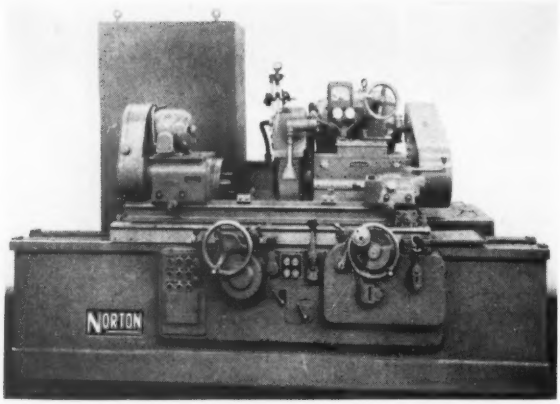
Speedgrip Precision Internal Chucks will save you money on second operation work.

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SPEEDGRIP CHUCK

820 N. WARD STREET
ELKHART, INDIANA



Norton 10 x 36-Inch Type CTU-HD Semi-Automatic Cylindrical Grinding Machine

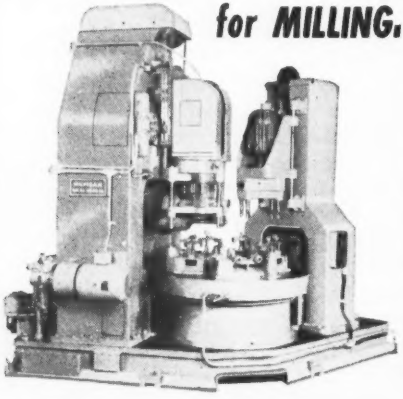
Cylindrical Grinders Made in 18, 36, 48, and 72-Inch Work Lengths

The Norton 10-Inch Type CTU-HD and 14-Inch Type LCTU-HD Plain or Semi-Automatic Cylindrical Grinding Machines announced by Norton Co., Worcester 6, Mass., are made in 18, 36, 48, and 72-inch work lengths for rapidly and accurately performing plunge-cut and traverse grinding operations that require large diameter or wide grinding wheels. An important feature of the machines is the heavy wheel head with a super-duty size pressure-lubricated wheel spindle which accommodates wheels up to 10 inches wide. Wheel feed is afforded by a "revolving feed screw" type mechanism having a "click-count" index by which settings for 0.0001-inch work diameter reduction are said to be made instantly.

The accessible placement on the front of the machines of all adjustments for feeds and speeds is said to simplify the

This 4-Way SPECIAL MACHINE

for MILLING, DRILLING and TAPPING



is one of the special machines we are constantly building, in addition to our line of MULTIPLE DRILL HEADS, to meet the specific requirements of plants, large and small. . . . So, for your DRILLING, REAMING, TAPPING, SPOT FACING, CHAMFERING, COUNTERBORING, NUT DRIVING and BORING operations, use Michigan Multiple Equipment and reduce costs, speed production. WRITE, WIRE or PHONE for literature and details.

MICHIGAN DRILL HEAD CO.

971 E. EIGHT-MILE ROAD • HAZEL PARK, MICH.

New MATHISON SELF ALIGNING STRAP-CLAMP

5" strap clamp holds work pieces up to 2" and the 8" clamp up to 3" without blocking or shims. Ball and socket arrangement make the gripping members free-floating and universal and enables the clamp to hold work pieces with inclined surfaces in any direction. Ball washer on bolt enables bolt to stay vertical. *Choice territories available to distributors.*



EVERETT SALES CO., 4116 Fourth Ave., Brooklyn 32, N. Y.



You Need an Extra Hand Now to Speed Up Production!

HEIMANN TRANSFER SCREW SETS

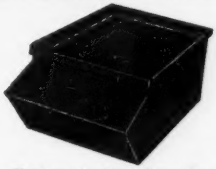
Here is the *faster,* more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work *now*—save money too!

IN 11 SIZES—No. 6 to 1" N.C. In all S.A.E. sizes.

HEIMANN MFG., CO. ● URBANA, OHIO



"Stack Up"



Sterling Bin Front "Top Rim" Steel Stacking Box. Size: 18" x 12" x 6".

THESE BOXES AGAINST ANY!

Once you use and compare Sterling stacking boxes, you'll know why we invite comparision in design, construction, and price. Our "Top Rim" construction provides stronger support all around the box . . . no corner inserts to become loose and fall out. Efficiency in designing and manufacturing allows us to quote favorably on any type or size stacking box.

Write for literature and prices.

Sterling Factory Equipment Co., 183 Charles St., Providence, R. I.



Sterling "Top Rim" Steel Stacking Box with drop handles. Size: 18" x 12" x 6".



setup and operation. Work rotation and coolant flow are automatically controlled, and all pumps and motors are mounted on the outside of the machines. The semi-automatic machine has an automatic grinding cycle which operates under one-lever control, thus simplifying operating effort to the extent that it may be possible for the operator to attend more than one machine. The plain machine provides all the above features with the exception of the automatic grinding cycle for plunge cuts. The plain machine is said to be ideal for traverse grinding operations.

Cold Cleaners for Metal Parts

Designated as Houghto-Clean 439 and 440, two cold cleaners which are designed for use in combination at room temperature in power washers for removing soil, such as heavy drawing oils, rust preventatives, and polar type smuts from ferrous metals, copper, and brass, have been announced by E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa. The cleaners include a special anti-rust inhibitor which is said to passivate the surface of the metal, providing good oxidation resistance for metals being processed.



Humidity Cabinet

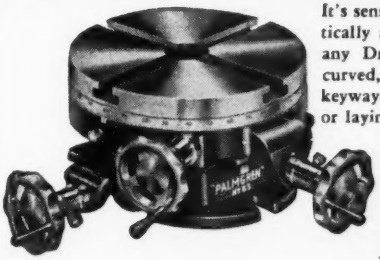
A constant-temperature humidity cabinet which is designed for tests (A.S.T.M.) involving 90 to 100 per cent relative humidity at from 4 to 70 deg. C. (39.2 to 158 deg. F.) dry bulb temperature has been announced by Blue M Electric Co., 306-308 W. 69th St., Chicago 21, Ill. The cabinet incorporates a counterflow baffle which is said to provide and maintain a direct, definite, and vigorous around-and-around chamber atmosphere circulation while conserving cooling water when testing at temperatures below the ambient temperature.

An automatic hydraulic electric thermostat controls temperature and is said to have response sensitivity of plus or minus ½ deg. C. The interior and exterior of the cabinet is constructed of stainless steel. The unit has a wattage consump-

PALMGREN

ROTARY TABLE

The Only Table Having ROTARY FEED Combined with DUAL CROSS FEEDS



It's sensational—in price, construction, performance. Practically a universal milling machine. Designed for use on any Drill Press or Milling machine. Rout straight or curved, rabbet, drill, sand or mortise. Mill slots, grooves, keyways, squares, hexagons, curves, flats, dovetails, index or laying out work.

Precision made, it permits fine work to close tolerances. Rotary feed is calibrated in degrees; Cross Feed in thousandths. Cross slides and feeds are 2⅛" each side of center—4¼" overall. Adjustable gibs on cross slides—40 to 1 worm and gear ratio in rotary feed. 4 Bolt slots—2 Lock screws. Order NOW!

No. 83—8" Table $54.50

No. 82—Without Rotary Feed $39.75

Write for Circular No. 302

CHICAGO TOOL AND ENGINEERING CO.

Mfrs. of **PALMGREN PRODUCTS** *for over 34 years*

8399 South Chicago Ave., CHICAGO 17, ILL.

Why break your back ...SAVE TIME, LABOR, MONEY with

Medelton Motor Driven

"Poweroll"

$270.00
F. O. B. N. Y.
800 LBS. CAP.



FEATURES . . .

- Eliminates hazards of lifting heavy rolls.
- Roll on your coil and it's ready to go.
- Slack loop prevents drag on feed or dies.
- 30% to 40% higher daily production on hand or automatic feeds.
- Re-loading time kept to a minimum.
- No pulling of coils, avoids operator's fatigue, and results in faster feeding.

Write for circular • Dealer inquiries invited.

WM. HALPERN & CO., INC.
Machine Tools
55 PARK PLACE, NEW YORK 7, N. Y. — 285 CONNECTICUT AVE., BRIDGEPORT, CONN.

$357.00
F.O.B. N.Y.
2000 LBS. CAP.

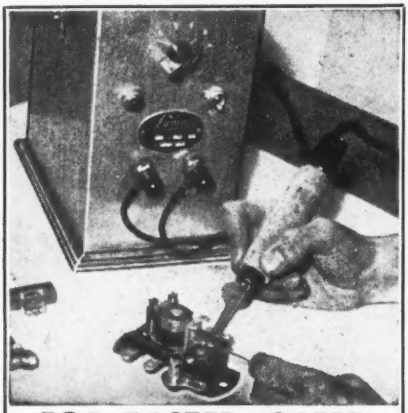
Precision

WHEEL DRESSING TOOL



Precision Model No. 21 truing tool (specially designed abrasive wheel) offers finest method of dressing diamond wheels and grinding wheels. Shaft mounted ball bearings. Enclosed wheel tension mechanism eliminates end play. Easily mounted on surface grinding table. Write for details.

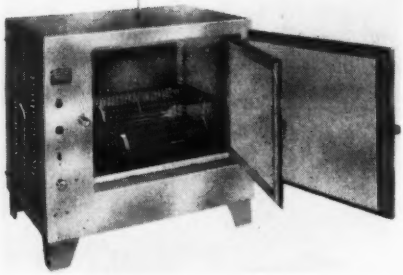
THE PRECISION TRUING TOOL & MFG. CO., INC.
13 EAST 16TH STREET COVINGTON, KY.



FOR FASTER, SAFER SOLDERING

The Luma resistance method of soldering is the accepted way for small shops requiring single operation to large plants with many types of operations. Write for complete information about this remarkable tool.

LUMA ELECTRIC EQUIPMENT CO.
P. O. Box 132-M.S. Toledo 1, Ohio



Blue M Constant-Temperature Humidity Cabinet

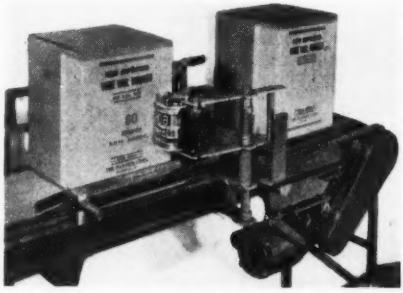
tion of from 450 to 1,250, and all wiring is complete. The cabinet is available in four standard sizes with a chamber which ranges from 1 to 9 cubic feet.

Machine Prints One or Two Sides and Top of Containers on Conveyor

Designated as the "Master Marker," a machine which prints one or two sides and the top of corrugated fiber or wood containers while they are on a conveyor has been announced by The Pannier Corp., 202 Pannier Bldg., Pittsburgh 12, Pa. The printer utilizes interchangeable holders for printing that can be quickly and easily changed. Pannier deep-molded National Type and Logotypes are said to eliminate background printing.

The machine is equipped with reservoir-type ink fountains. The printing die cylinder automatically returns to the starting position after each imprint. The size of the printing roll is 6 inches from left to right and 3½ inches from top to bottom. The unit can be mounted on any standard conveyor and is built to requirements.

Pannier "Master Marker" Printing Unit mounted on a conveyor



STANDARD



TAPER PINS

The high quality and accuracy of Standard Steel Specialty Taper Pins have won them wide acceptance. Milled from bar stock, straight to taper and to extremely close tolerances, these pins give 100% performance. The uniformity and accuracy of the pins saves valuable time at assembly, assuring you trouble free service.

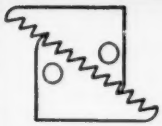
Write for complete catalog giving information on taper pins, Woodruff keys, machine keys and machine racks.

STANDARD STEEL SPECIALTY COMPANY

BEAVER FALLS PENNSYLVANIA

PLANTS BEAVER FALLS, PA. • HAMMOND, IND.

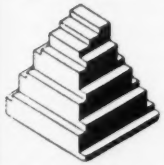
REID Set-up Aids



Step Set-Up Blocks Steel—Maple



Magnetic Blocks and Parallels



Pyramid Set-Up Blocks



T-Slot Bolts

Also Hand Wheels, Machine Handles, Levers, Cranks, Plastic Balls, Cast Iron Knobs, Machine Vises.

Write for Catalog and Prices on Complete Reid Line

REID TOOL SUPPLY CO.

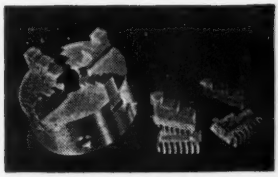
709 BAKER ST. MUSKEGON HTS., MICH.

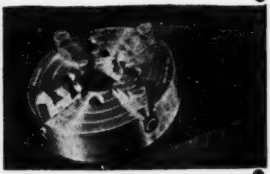
IMMEDIATE DELIVERY FROM STOCK

BURNERD CHUCKS

PRECISION BUILT MADE IN ENGLAND







SELF CENTERING GEARED SCROLL

Nickel Chrome Steel Pinions & Scroll, Semi-Steel Body. Universal Three Jaw, Two Sets of Jaws, Three Pinion

Model	Size	Wt. lbs.	Price
28	2¾"	2½	$ 25.00
29	3¼"	3½	26.50
30	4"	6½	30.00
30A	5"	11¾	37.50
31	6"	17¼	45.00
30BP*	4"	8¼	33.50
30ABP*	5"	15	42.50
31BP*	6"	21	50.00
52	7½"	29	57.50
53	9"	43	67.50
54	10½"	62	95.00
55	12"	88	125.00

Universal Four Jaw, Two Sets of Jaws, Two Pinion

Model	Size	Wt. lbs.	Price
29Y	3¼"	3¾	$ 30.00
30Y	4"	7	37.50
30AY	5"	12½	43.50
31Y	6"	18¼	52.50
52Y	7½"	29	85.00
53Y	9"	42	95.00
54Y	10½"	62	110.00
55Y	12"	88	150.00
30AYBP*	5"	15¾	48.50
31YBP*	6"	22	57.50

Soft Jaws Available

LIGHT INDEPENDENT CHUCKS

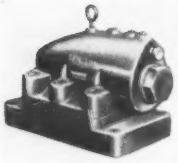
Nickel Steel Operating Screws, Semi-Steel Body. Four Jaw Reversible, Hard Steel Jaws

Model	Size	Wt. lbs.	Price
35A	3¼"	2¾	$ 12.50
35B	4"	4	14.00
35C	4½"	5	18.50
34	6"	10	22.50
35BP*	4"	6½	18.00
35CBP*	4½"	7	22.50
34BP*	6"	14	26.50

*Models marked with asterisk (*) are fitted with 1½—8 Back Plate for all popular 9" and 10" lathes.

DE WITT EQUIPMENT CO. 136 Lafayette St., New York 13, N.Y.

Telephone: WA 5-4048



Denison 2-Inch "HydrOILic" Relief Valve

Relief Valve for Pressure Control

A 2-inch "HydrOILic" Relief Valve designed to provide pressure control up to 5,000 p.s.i. with volume capacities up to 125 g.p.m. has been announced by Denson Engineering Co., 1153 Dublin Rd., Columbus 16, Ohio. The valve features exceptionally low differential between opening and closing pressures which result in fast action, accurate pressure control, and a reduction in over-pressure and pressure-drop conditions. Pressure setting is adjusted by a knurled screw on the valve cap. Provision has also been made for remote control of this regulation. The valve is available in either threaded body or subplate mounting.

If the valve is T'd off the pressure line, oil flows through only when the circuit is relieved in excess of the pressure setting. When using the subplate-type mounting, the relief valve is necessarily T'd off the pressure line because of its design, and the piping is connected to the subplate. This type installation provides a means of removing the valve at any time without having to break the pipe connections.



Lubricant Additive

Designated as Molykote M-55, a collodial dispersion of Molykote powder (highly purified and concentrated molybdenum - disulfide) suspended in a synthetic vehicle compatible with any petroleum or sulfur base cutting or lubricating oil has been announced by The Alpha Corp., 174 Hamilton Ave., Greenwich, Conn. Molykote M-55 is said to be ideal as an extreme bearing pressure additive to conventional oils in force-feed lubricating systems of machinery and as an additive to cutting and coolant oils whenever the frictional component is a substantial part of the total cutting force, such as thread rolling and various high-speed forming operations.

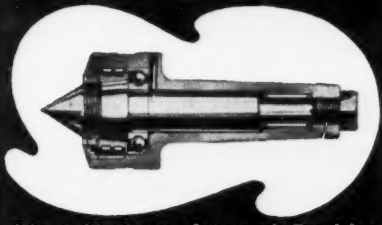
SINCE 1931, EXPERIENCE IN
PRECISION CENTERLESS GRINDING

Single or multiple diameter pieces. High in quality—accurate to blueprint—prompt service. In position to handle large or small lots.

Inquiry invited.

COMMERCIAL CENTERLESS GRINDING CO.
6605 CEDAR AVE., Phone EN 1-3412 CLEVELAND 3, O.

NIELSEN
Heavy Duty
Live Centers



Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.

Write for catalog M on live centers

NIELSEN, INC. LAWTON, MICHIGAN



Keep OUT OF TROUBLE IN MAKING SET-UPS!

On tapping and reaming jobs you'll save yourself a lot of trouble and also a lot of time if you use a Ziegler Tool Holder in making your set-ups.

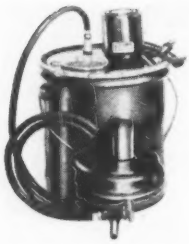
In the first place, it is unnecessary, as with ordinary tool holders, to make an absolutely accurate set-up in order to produce perfect work. Why? Because the Ziegler automatically compensates for inaccuracies of as much as 1/32" radius or 1/16" diameter.

This means too that the set-up can be made in shorter time—and time saved means money saved!

Get a Ziegler Holder and see how it will simplify the making of tapping and reaming set-ups.

Ziegler ROLLER THRUST FLOATING HOLDER for Taps and Reamers...

W. M. ZIEGLER TOOL CO.
13566 AUBURN
DETROIT 23, MICH.
WRITE FOR CATALOG



Gelber "Bantam" Coolant Pump

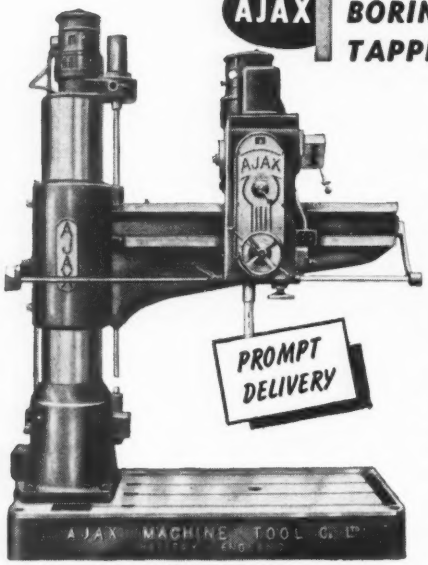
Coolant Pump

Designated as the "Bantam," a self-contained coolant pump system which is designed for use with drill presses, lathes, tappers, cut-off saws, grinders, belt sanders, milling machines, screw machines, and other small machine tools has been announced by Samuel S. Gelber Co., 162 N. Clinton St., Chicago 6, Ill. According to the manufacturer, the pump has a capacity of 400 g.p.h. at zero head, 300 g.p.h. at 2 feet, 225 g.p.h. at 4 feet, and 200 g.p.h. at 6 feet. Lower volumes are said to be attainable with higher-than-water viscosity.

The pump incorporates a 1/30-h.p. continuous-duty fan-cooled 1,500 r.p.m. single-phase motor and a 5-gallon tank with a corrosion-resistant lining. Standard equipment includes a 6-foot oil-resistant discharge hose with flow control valve and nozzle, conduit box, start-stop switch, 8-foot electric cord, plug and filter screen.

Made in Halifax, England – Britain's Machine Tool Center!

AJAX RADIAL DRILLING BORING and TAPPING MACHINE



... Featuring internal pillar with full length sleeve to eliminate end lift of arm. Extreme rigidity is assured with easy and positive locking arrangement! 3" diameter drilling capacity in cast iron.

The Ajax Radial Drill meets all the demands of the best high speed steel and carbide tipped tools. High quality materials and workmanship together with the utmost ease of handling the centralized controls guarantee a long and trouble-free life.

Write today for full specifications.

PARTIAL SPECIFICATIONS

Max. radius of spindle from ctr. of col.	5'0"
Saddle traverse along arm.	3'2"
Baseplate:	
Length of working surface	4'9"
Width of working surface	3'0"
Height of working surface	9"
#4 Morse taper:	
Spindle speeds (8)	60 to 1114 rpm

Sales Territories Open

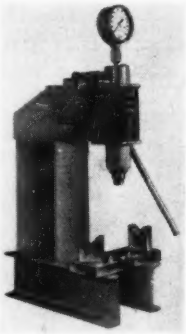
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Manufacturers • Merchants • Distributors
410 BROOME STREET • NEW YORK 13, N. Y.
CANAL 6-7400 • CABLE ADDRESS: WOODWORK, N. Y.

Send for complete 1953 catalog, now ready!

Hydraulic Arbor Press

A bench-type hydraulic arbor press which features a 10-ton capacity has been announced by Manzel, 315 Babcock St., Buffalo 10, N. Y. According to the manufacturer, the press is ideal for use in the toolroom, laboratory, or machinery overhaul department for such applications as bending, straightening, material testing, bushing or bearing removal, and so on.



Manzel Bench - Type Hydraulic Arbor Press

HIGH SPEED PRODUCTION
CONTINUOUS OIL GROOVING

WICACO CONTINUOUS OIL GROOVER cuts grooves of all descriptions, internal or external, continuous or intermittent.

Send us samples for grooving. We will return them cut to specifications, with a record of time and cost estimate. No obligation.

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WICACO MACHINE CORPORATION

SINCE 1868

WAYNE JUNCTION, PHILA. 44, PA.

Manufacturers of
Precision Machinery and Machine Parts
Roller Bearing Twister Spindles—Spindle Oiling Machine
Precision Internal Grinder — Screw Machine Products.

SAWMASTER HACK SAW



6" x 7" capacity saw illustrated. 4" capacity at 45° angle.

In every plant there is a large variety of uses for the SAWMASTER Hack Saw. Its *self-contained portability*, its *low cost*, and *rugged construction* to handle work in capacities of 6" x 6", 4" x 4", and 6" x 7" with 5 models make it an economical, accurate, efficient and versatile machine. Many superb features. All SAWMASTERS operate with efficient push-cut action.

Write for Bulletin 300.



MILLER-KNUTH MFG. CO. OMAHA, NEB.

A gage registering in tonnage is available as optional equipment, and V-blocks and a bearing plate are furnished as standard.

Machine Grinds Threads of 20 Pitch and Finer

A small, precision thread grinder which is designed to handle threads of 20 pitch and finer has been announced by The Sheffield Corp., Dayton 1, Ohio. The finest pitch recommended for the machine is 124 on a U. S. form; however, finer pitches, it is claimed, can be ground in the Whitworth form. According to the manufacturer, the machine will handle work up to ½ inch in diameter and 4 inches between centers.



Sheffield Precision Thread Grinder in use

The lead screw is driven through change gears, making possible an easy and rapid change-over from one pitch to another. Because of its accuracy and precision, the machine is recommended by the company for producing close-tolerance fine-pitch threads, such as those found on precision-ground taps, thread plug gages, micrometer spindles, elevating and adjusting screws used in precision instruments, and many other components. The grinder may be equipped with Sheffield Crushtrue dressing equipment for the grinding of some small and intricate forms.

EISLER JIG BORING
CAM MILLING
A SPECIALIZED CAM MILLING SERVICE... JIG BORING... SPOT WELDING... CONTRACT PRODUCTION ...EXPERIMENTAL DEVELOPMENT
EISLER ENGINEERING CO., Inc.
734 So. 13th St. Newark 3, N. J.

ATLANTIC GEARS
SPUR - SPIRAL - WORM BEVEL GEARS GENERATED WITH PRECISION ON MODERN EQUIPMENT
Send Samples or Blueprints for Quotation
Call CAnal 6-1440
ATLANTIC GEAR WORKS, INC.
198-A LAFAYETTE ST. • NEW YORK 12, N. Y.

STOP Oily Floor Mishaps with FULLER'S EARTH
Avoid costly accidents caused by slipping on oily or greasy floors! Reduce fire hazards! Replace sawdust or wood shavings with Fuller's Earth. Every shop needs this low-priced safety aid. Fuller's Earth *absorbs* oil and grease—and it's non-inflammable. Write for FREE SAMPLE to test.
TAMMS Dept. RM-9, TAMMS INDUSTRIES, Inc., 228 N. La Salle Street, Chicago 1

COMPLETE SPRAYING UNIT— ONLY $15.95



BECKER CO_2 POWERED SPRAY GUN

Shops throughout the country are finding they can't be without this rugged industrial-type Spray Gun. "Dress up" your jigs and fixtures and protect them against rust. Becker Spray Gun eliminates cumbersome hoses, electric cords, compressors—permits taking the spray *to the work*. Powerful CO_2 cartridge sprays up to one 21 oz. containerful. Sprays paints, rust-proofing, waxes, oils, dressings, fireproofing, water-proofing, etc.

SEE YOUR DISTRIBUTOR! If he cannot supply you, send $15.95; we ship postpaid. Extra CO_2 cartridges, 10 for $1 postpaid.



ONLY $15.95 with 3 cartridges

SULLIVAN-BECKER CO., Dept. 453B, KENOSHA, WIS.

M-Z-B

Precision Vernier Calipers

ACCURATE • DEPENDABLE



A tool to comply with the most exacting demands. Made by the leading European precision tool craftsmen. Measures inside, outside, thread and depth.

The following models have the famous **M-Z-B** cam lock which guarantees fixed and never shifting setting when pressure on lock is released.

No. 30-61	Chrome Steel	.001" and 1/128"	$14.00
No. 30-64	Chrome Steel	.001" and 1/20 mm	$14.00
No. 30-62	Stainless Steel	.001" and 1/128"	$16.50
No. 30-65	Stainless Steel	.001" and 1/20 mm	$16.50

No. 30-78 Chrome Steel with set screw... .001" and 1/128" ..... $ 9.75

Total length of above models 8" — Scale 6"

12" Calipers and Height Gauges also available. Leather cases supplied free of charge with each caliper.

In stock: **M-Z-B** Micrometers, 1", size to read .0001".

A very fine tool comparable only to the best, $15.00

We are interested in representatives in various territories, regarding an agency or dealership for **M-Z-B** fine measuring tools.

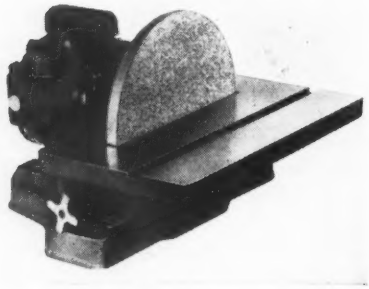
FOR INFORMATION CONTACT:

INTER-CONTINENTAL TRADING CORP.

90 WEST STREET • NEW YORK 6, N. Y.

Disc Sander Can Be Used for Grinding, Deburring, and Chamfering Operations

Designated as the No. 85, a 10-inch disc sander which can be used for a wide variety of grinding and deburring operations, as well as for chamfering and rounding of corners, has been announced by Tomlee Tool & Engineering Co., Inc., Minneapolis 1, Minn. The sander is constructed from heavy cast iron and incorporates a precision machined and balanced faceplate to minimize vibration. The table is accurately ground and slotted to accommodate a miter gage for forming any compound angle up to 45 degrees. The table of the sander measures 15½ x 9¾ x 12 inches high.



Tomlee No. 85 10-Inch Disc Sander

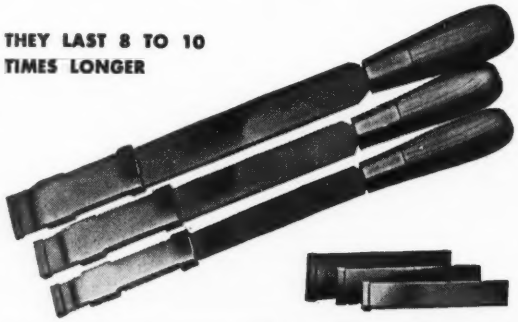
Standard equipment includes sanding discs, faceplate, disc adhesive, and instructions. An easily installed dust collector, motor, and miter gage are available as extra equipment.

Machine Inspects Contour and Timing of Engine Camshafts

Vinco Corp., 9111 Schaefer Highway, Detroit 28, Mich., has announced a camshaft comparator which is designed to inspect engine camshafts against a master cam to determine the variances in the cam contour of the part. The master cam is ground and lapped to an accuracy of 0.0001 inch. Cam contour variances are shown on a 0.0001-inch dial indicator and simultaneously recorded on a linear chart. According to the manufacturer,

CARBOLOY TIPPED SCRAPER BLADES

Available in three widths



Especially good for hard alloy iron and extremely hard bronze castings. If you are using Anderson Hand Scrapers it is not necessary to buy complete new scrapers in order to use carboloy tipped blades. Simply remove high-speed blade and slip in the Anderson Carboloy Tipped Blade.

Write for Bulletin 22-2

ROCKFORD Anderson BROS. MFG. CO. ILLINOIS

ANDERSON BROS. MFG. CO., Rockford, Ill.

Balancing Ways, Roto Checkers, Hand and Power Scrapers, Spotters, Hand and Power Hydraulic Straightening Presses.

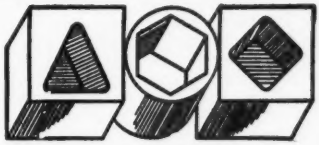


NEW NESTING TYPE

TOTE PANS

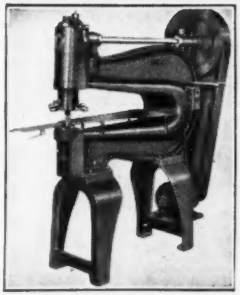
Sturdy 16 ga. metal. 20" long x 12" wide x 6¼" deep. Drag holes and handles at both ends.

J. L. LUCAS & SON, INC.
Bridgeport 5, Conn.



DRILL THESE HOLES
BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
WATTS BROS. TOOL WORKS
Wilmerding, Pa.

SAVAGE
NIBBLING MACHINES



CAPACITIES UP TO ¾"

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ASK FOR FREE BULLETIN "I"

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"NIBBLE YOUR COSTS"
FOR TUBE SLOTTING, TUBE SHAPING AND CUTTING FLAT SHEETS BY TEMPLATE OR TO A SCRIBED LINE.

W. J. SAVAGE COMPANY
Knoxville *Since 1885* **Tennessee**
PIONEER MFRS. OF NIBBLING MACHINES

WHY tie up EXPENSIVE MACHINES and SKILLED MACHINISTS? WHEN

EASY ECONOMICAL SET-UP

EXCLUSIVE 3-WAY TRAVEL



- **UNSKILLED Operators can do**
- **close-precision work on quantity**
- **runs of small parts with the**
- **BARKER Bench Type MILLER**

Smart "operators" in the metalworking field are using the BARKER "MILLER," a small precision production machine to handle many of their large volume runs on small parts. You can afford to set up several "Barkers" if necessary and leave them set up for successive operations on one particular part. Large, expensive machines left set up and idle can cut your profits.

PRODUCTION MODEL

Tool Room Model Available with Micrometer Feed Screws

A "Barker" will economically handle a complete range of milling, drilling, key-seating, end milling, slotting and simple lathe operations.

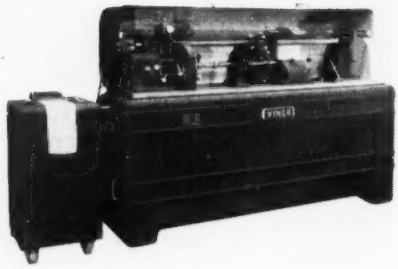
One or more "Barkers" will earn dividends in your plant. Write for full particulars.

DEALERS write for our PROPOSAL

BARKER ENGINEERING COMPANY
500 Green Rd., Cleveland 21, Ohio

the dial indicator readings and chart recordings are identical and will repeat within 0.0001 inch. Cam lobe and keyway timing errors are shown on an inbuilt vernier-equipped graduated plate, and the timing check is said to be accurate to within one minute of arc.

Although the instrument is tooled for an individual camshaft, a wide range of sizes, it is claimed, can be accommodated. Camshafts that are similar in all respects, except cam contour, may be inspected by making minor change-overs, and a major tooling change-over is necessary if an entirely different camshaft is to be inspected.

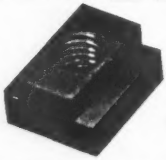


Vinco Camshaft Comparator

Vibratory Feeder Has Feeding Capacity of up to 500 Lb. Per Hour

Designated as the Model F-00, a small vibratory feeder which is said to have a feeding capacity of up to 500 lb. per hour of bulk material to various types of industrial processing equipment has been added to its line by Syntron Co., 309 Lexington Ave., Homer City, Pa. The new model utilizes the same electromagnetic vibrating principle as its larger counterparts, eliminating gears, bearings, belts, idlers, and so on. The unit measures 7¼ inches high x approximately 14 inches long and weighs 14 lb., making it suitable for incorporation into weighing and packaging machines and other types of processing machines.

Control of the rate of material flow from the feeder is by a rheostat in the


T-NUTS
STUD SETS
STRAP CLAMPS
SURE GRIP STEP BLOCKS
TIETZMANN TOOL CORP.
ENGLEWOOD, OHIO

Columbia
TOOL STEELS for all tools for all purposes
★
HOT WORK-
SHOCK RESISTING:
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Quick Shipment on
TAPER ATTACHMENTS

For All Lathes—Old or New—
9" to 36" Swing
Write for Bulletin
MASTER-TAPER COMPANY
4531 N. Beacon St., Chicago 40
Excl. Mfrs. of Taper Attachments
$29.50 to $149.50



"SHUR-GRIP" DROP FORGED HANDLES

Designed to hold 3 to 6 lb. lead hammer heads more firmly—will not slip—keeps hammer head in shape longer—to make remolding easier, quicker, surer, less expensive. Write for folder.

LAWRENCE H. COOK, INC.
67 Massasoit Ave. E. Providence 14, R. I.

HIGH SPEED DRILLS

FLAT TWISTED AND ROLLED SECTION



Special Lengths and Types
PROMPT DELIVERY
Manufacturers Since 1903

HI-DUTY DRILL WORKS
FLEETWOOD, PA.

REDUCE YOUR HARDNESS TESTING COSTS WITH



Gilmore Diamond Penetrators

ROCKWELL CONE **$20.**

GILMORE QUALITY

VICKERS PYRAMID **$32.**



F. F. GILMORE & CO.
725 Boylston St., Boston 16, Mass.

BORING TOOLS

with

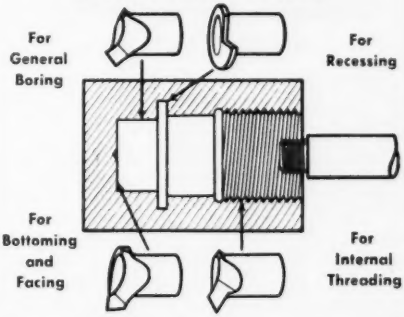
EXTRA ADVANTAGES!

SOLID TYPES!
Standard length and extra long ½", ¼", ⅜" shanks



- BETTER QUALITY. Made of Tungsten-Cobalt Highspeed Steel — or carbide tipped.
- INEXPENSIVE AND ECONOMICAL. Easy to resharpen by grinding top face only.
- ALSO—full sets in hardwood box
  tool holders
  recessing tools for screw machines

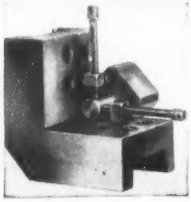
FOUR FORMS ON ONE BAR!
DETACHABLE HEADS



Write for CATALOG & PRICE LIST.

R. B. TOOL CO., Inc.
785 N. Broadway, White Plains, N. Y.

SQUAR-IT CLAMPING BLOCKS

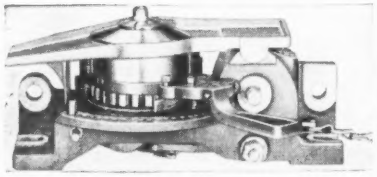


Save costly set-ups in holding small work. All surfaces ground square with their opposite and right angle faces . . . to assure a perfect job on removal from block. Square sliding clamps are fitted to broached holes for easy removal. Furnished with two long and two short sliding clamps. *Write for folder.*

Also Manufacturers of Drilling Plates and Radius Emery Wheel Dressers

TALLMAN TOOL & MACHINE CORP.
ROCHESTER • NEW YORK

MODEL H AUTOMATIC
Chucking & Indexing Fixture

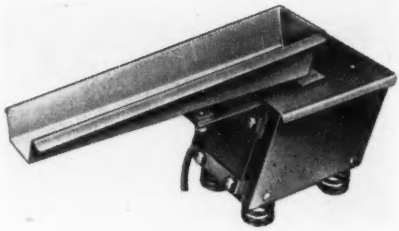


1. 1800 light cuts per hour.
2. Either horizontal or vertical position.
3. Collets changed instantly.
4. Automatically knocks piece out.
5. Ratchet or degree indexing — degree indexing added later if desired. Capacity 1".
6. Automatic indexer also added later.

Model F—Both degree and ratchet indexing Capacity up to 2¼".

Write for Folders

J. W. DEARBORN • Ansonia, Conn.



Syntron Model F-00 Vibratory Feeder

separate controller. The rate of feed, it is claimed, can be regulated from a mere trickle to a gushing flow.

Tool and Work Stand Is for Use Near Machines

Bay Products Inc., 3015 N. 16th St., Philadelphia 32, Pa., has announced a tool and work stand which is designed for use near machines or as a light work stand. The stand is 30½ inches high and incorporates two shelves of 14-gauge steel with a 2-inch flange. The legs are made of 1¼ x 1¼ x ⅛-inch angle iron. Each shelf is reversible and is attached to the legs by 16 bolts and lock nuts, thus providing unusual rigidity to the assembly. The unit is finished in baked green enamel.

Bay Tool and Work Stand



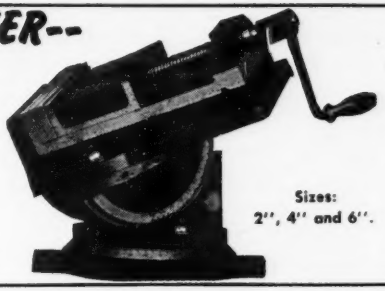
MAKE SET-UPS *FASTER--*

Conserve valuable production time by using the fully universal, easily-operated MASTER MULTI-SWIVEL VISE for intricate, angular set-ups in your shop. Three swivels instantly set any compound angle. Used in shops throughout the world. Interchangeable platen optional.

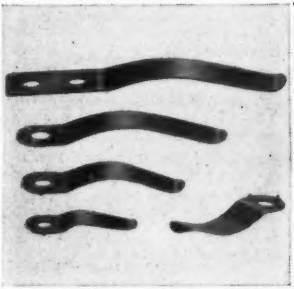
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DONOVAN MFG. CO.

80 BATTERYMARCH ST., BOSTON 10, MASS.



Sizes:
2", 4" and 6".



ALSCO Self-Locking Tool and Die Makers' Springs

Tool and die shops, press rooms, machine shops, etc., will find these handy neat looking springs the answer to their flat spring requirements. They cost but a fraction of hand made springs. Made in four lengths from 1" to 2¾" and eight thicknesses from .010 to .032.

IMMEDIATE SHIPMENT FROM STOCK.
SAMPLES AND PAMPHLETS UPON REQUEST.

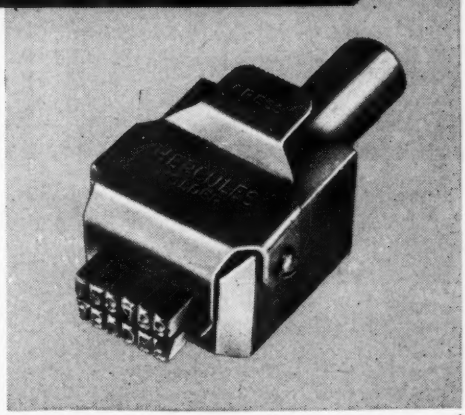
ALSCO COMPANY, 1770 Stone Road, Rochester 13, N. Y.

HERCULES DOUBLE-LINE PRESS HOLDER
permits instant interchanging of type!

FIRST to permit two lines of type to be changed by thumb pressure on single holding clip.

FIRST in extra quality of steel and strictly engraved "shoulder style" type.

Write for literature and prices to—

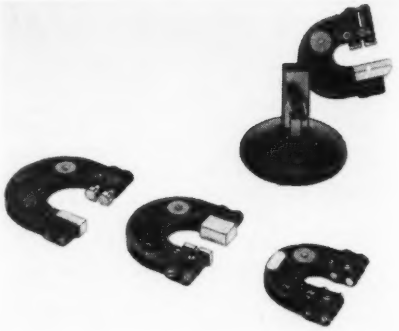


The **ACROMARK** *Company*

9 MORRELL STREET
ELIZABETH 4, NEW JERSEY

Snap Gage Is Designed for Inspection and Production Checking

H v Tool & Instrument Co., 150 Lafayette St., New York 13, N. Y., has announced an adjustable-limit snap gage which is available in three models, covering a wide variety of ranges. The Model A has a capacity from 0 to 6 inches, while the Models C and SC range in capacity from 0 to 5½ inches. According to the manufacturer, the gage is ideal for close-tolerance checking where rigid standards are maintained.



H v H Adjustable-Limit Snap Gages

In use, the outer anvils or gaging buttons of the gage are set to the maximum size allowed by the blueprint, and the inner anvils are set to the minimum size. The inspector merely passes the work through the outer anvils. A stand is available for use when the gage is being set and while parts are being inspected, thus eliminating error due to body heat.

Toolholders Designed for Use on Turret Lathes, Drilling, Cutting, and Reaming Machines

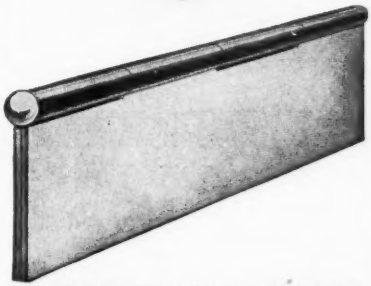
Brookfield, Inc., 755 Boylston St., Boston 16, Mass., has added two additional toolholders to its line. The Model DB, it is claimed, has radically reduced body dimensions as compared with the original Model DA and still will hold any diameter tool from $\frac{1}{4}$ to $\frac{1}{2}$ inch. The Model GA holder has increased body dimensions to make possible the holding of any diameter tool from $\frac{1}{16}$ to $\frac{3}{4}$ inch.

Designed for use on turret lathes, drill-





AUTOM



CONTINUOUS HINGES

Manufactured by

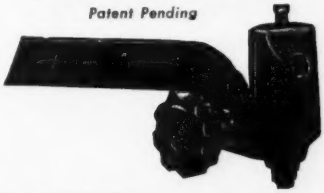
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Monarch Precision
SHAPLANE
Radius Tools

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Tool Room Specialties

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Beverly THROATLESS SHEAR

Cut any Shape... **STRAIGHT OR IRREGULAR**



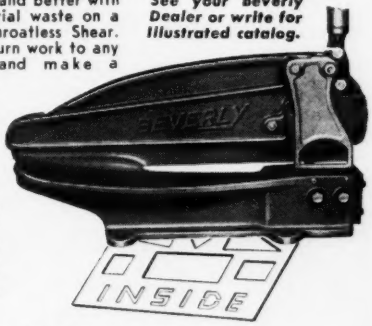
B-3 with Ball Bearing Hold Down

Make any cut — curved, straight or irregular, faster, easier and better with less material waste on a Beverly Throatless Shear. You can turn work to any position and make a clean cut as you go. Handles heavy gauges with ease — lighter metals without distortion. 4 models—capacitites 18 gauge to 3/16" mild. All shears equipped with High Carbon, High Chrome Blades.

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8" Reach—16 ga. cap. Makes inside slotting cutting faster, easier, cleaner. Punch and die arrangement of 5 blades assures accuracy, clean cutting action. Cuts 2½"x1/16" slot at one stroke. Throat design permits pivoting work at any point in stroke for special inside cuts. Note sample cuts at left.

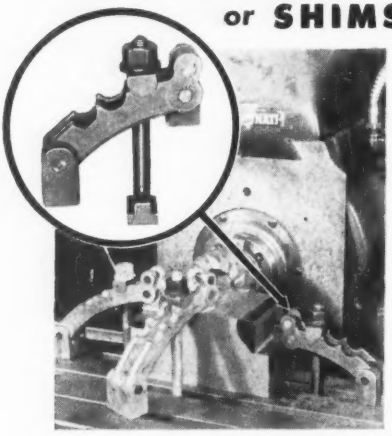
See your Beverly Dealer or write for illustrated catalog.



BEVERLY SHEAR MFG. CO., 3000 W. 111th St., Chicago 43, Ill.

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without **BLOCKS** *or* **SHIMS**



Pat. Pend.

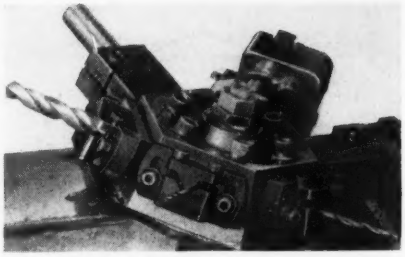
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LOW COST, fool-proof clamps increase machine output up to 30% ! Work pieces from paper thinness to 7½" are quickly clamped. Work-holding foot in horizontal position firmly grips narrow ledges or steps . . . also round bar stock in V-blocks. Available in "production" and "tool room" models.

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Brookfield Toolholders in use

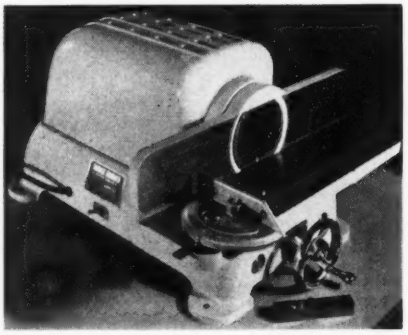
ing, cutting, and reaming machines, the holders incorporate precision ground working surfaces which are said to ensure that the shank and V-jaw section of the holder are permanently parallel within a tolerance of 0.0005 inch in 6 inches. According to the manufacturer, runout is less than 0.0001 inch per inch.

Machine Permits Grinding of Flat and Square Surfaces by Hand

Southwest Machine Works, 1309 Bridge Blvd., S.W., Albuquerque, N. M., has announced the Bridge Grinder which is designed to permit the grinding of unusually flat and square surfaces by hand without the aid of fixtures. A 5-inch cup wheel is mounted directly on the end of the motor shaft and is adjusted to protrude slightly through a stationary fence along which the workpiece is moved.

Grinding wheel adjustment through the table is controlled by a handwheel. The motor and mount are movable on two 1⅛-

Southwest Bridge Grinder



"THE ORIGINAL"
MAUSER MAUSER PRECISION VERNIER CALIPER
$14.75 PPD



NEW EXCLUSIVE CAMLOCK AND GIB IMPROVEMENT INSTANTLY FIXES SETTING, PREVENTS SHIFTING, GUARANTEES SQUARENESS OF JAWS.
THE MAUSER TRADEMARK.. IS YOUR PROTECTION.

MONEY BACK GUARANTEE
FOR MEASURING INSIDE, OUTSIDE, AND DEPTH.
3 GRADUATIONS
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1/10 m.m. IN BACK

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DIVIDING HEADS



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3 SIZES — 4 MODELS — 6" to 12"
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3525 Cardiff Ave., Cincinnati 9, Ohio

USE ECONOMY

Headless Set Screws

Socket Set Screws

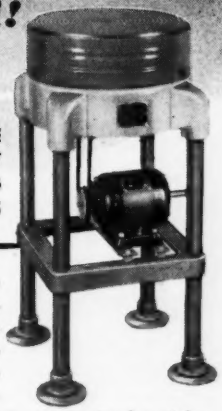


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ECONOMY MACHINE PRODUCTS COMPANY

5212 Lawrence Ave., Chicago 30, Ill.

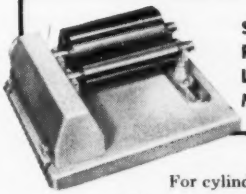
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SPITFIRE FLAT LAPPING MACHINES

Designed for accurate lapping any material where a perfectly flat surface is important. Finishes to extremely close tolerances are produced.

The perfectly flat surfaces of sliding and rotating parts, air and liquid tight seals, plastic and die casting molds are quickly accomplished with this machine tool.



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For cylindrical lapping, giving an accurate, mirror-like finish in less time than any other method. Ideal for plug gauges. Saves as much as ⅔ in lapping time.

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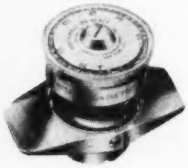
SPITFIRE TOOL CO.
2933 N. Pulaski Rd., Chicago 41, Ill.

inch round guide rails. The workpiece is moved across the face of the wheel by hand. The grinder utilizes a ½-h.p. totally-enclosed 3,450-r.p.m. 115-volt 1-phase motor, and a diamond dresser and miter gage is furnished as standard equipment.

Portable Metal Hardness Tester Provides Superficial Readings

Marketed under the trade name Ernst, a portable metal hardness tester which provides superficial readings without damaging the part or material being tested is now being distributed by Newage International, Inc., 235 E. 42nd St., New York 17, N. Y. The instrument provides a direct dial reading in Rockwell 15N scale from 70 to 95 and is said to have a maximum indentation of 0.003 inch and a maximum diameter of penetration of 0.006 inch.

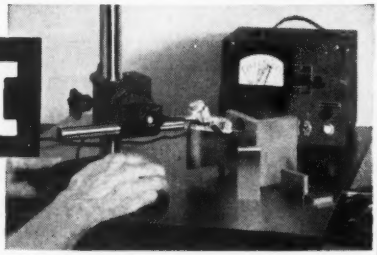
The tester has a spring-loaded diamond penetrator indentor, and readings appear on a 2-inch diameter scale. To obtain a reading, the handgrips are pressed downward, lowering the indentor housing to bring the under surface of the tester against the surface of the material being tested. Further depression of the handgrips is said to ensure penetration of the material's surface with the point of the indentor by the action of a calibrated helical spring. The movement of the indentor as it penetrates the material slightly compresses the diaphragm of a fluid-filled chamber, thereby forcing fluid into a capillary tube which encircles the dial to indicate the hardness number on the dial scale. The instrument is available in Rockwell A, B, C, and 15N scales and in Brinell Low and Medium scales.



Ernst Portable Superficial Metal Hardness Tester

For All-Around Shop Gaging with LABORATORY PRECISION

INDI-AC
Electronic Indicator



VERSATILE! Checks set-ups and runout, *on the machine.* Reaches ID's and remote surfaces—with meter located for convenient reading. Ideal for surface-plate work. Thoroughly proven in shops, tool rooms and gage rooms.

SENSITIVE! Reads .0005" and .00005"—or .0001" and .00001"—per division, either side of zero, on continuous linear scales. Both scales always give same reading.

DEPENDABLE! *Frictionless movement* and *freedom from drift* assure CONSISTENT REPEAT READINGS.

FAST! Instantaneous meter response permits fast readings—dependable runout measurements.

FREE INDI-AC BULLETIN
gives full details. Write for it!

AND ASK about the PAR-AC Electronic Production Gage; MICRO-AC Electronic Microcomparator (reads in millionths).



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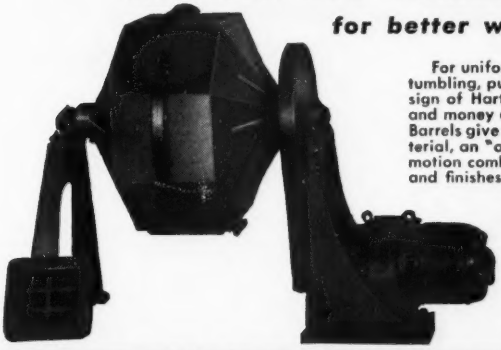
PATENTED END MILL

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CUTTING *and* TUMBLING BARRELS
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For uniform cutting down, wet or dry grinding, tumbling, pulverizing and mixing, the unique design of Hartford Triple Action Barrels saves time and money and produces better results. Hartford Barrels give a TRIPLE ACTION in tumbling the material, an "over and over, end to end, folding-in" motion combined, which quickly grinds off burrs, and finishes and smooths the general surface of any article in the load. These barrels are available in two sizes, large and small, and with both motor and belt drive. Hartford also makes steel burnishing balls scientifically correct in design and material for each specific job. Bulletin on request.

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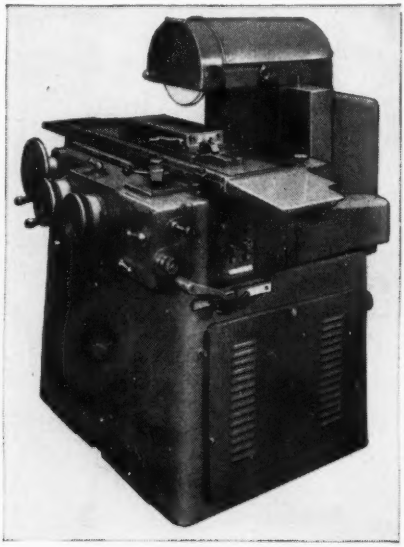
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New Haven 7, Conn.

Surface Grinder Provides a Satin-Smooth Finish

Designated as the Scrivener Model 9102/2, an 8 x 18-inch super-surface grinding machine which is said to provide a satin-smooth finish and which is capable of continuous and heavy stock removal on production work is now being distributed by Kelvin Systems Corp., 135 Front St., New York 5, N. Y. The machine incorporates a large wheel mounted on a large-diameter nitralloy spindle which operates on plain bearings. The table of the machine will accommodate a



Scrivener Model 9102/2 Super-Surface Grinding Machine

full-size vise, and all table movements, as well as cross-feed or vertical adjustment of the wheelhead, can be effected by hand or power. The table is provided with water channels for wet grinding and with T-slots for work-holding fixtures.

The column is a heavy casting, supported on well-lubricated vertical ways and actuated by means of an oversize lead screw with anti-friction thrust bearings. Power rise and fall is a standard feature, the power movement operating to within ½ inch of the total rise at which point a limit switch is operated that cuts out the power feed and leaves the column to be manually operated for

People work better when they SEE BETTER



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Magni-Focuser helps in conversion of wire into "points" for ball-point pens.

MAGNI-FOCUSER'S matched prismatic lenses give needle-sharp magnification. Comfortably light weight. Fits over regular glasses. Leaves both hands free. Normal vision may be resumed by lifting head.

MAGNI-FOCUSER

SPEEDS PRODUCTION

Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces eye-strain and *prevents squinting*—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.

Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

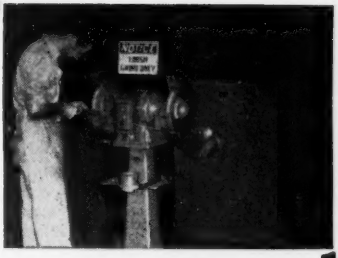
Magni-Focuser can help your plant produce better. Immediate delivery. 10-day trial without obligation. Return to us if not satisfied. $10.50.

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STOP DUST

With DUSTKOP





300 cfm to 10,000 cfm per unit (22 models) standard, pre-tested, available from stock.

Low cost, immediate control of dust from one remote dust source, or from a whole shop!

Ask for catalog 605-2

No obligation.

AGET-DETROIT CO.

207 Main St. Ann Arbor, Mich.

the last ½ inch of travel. The machine is normally supplied for dry grinding; however, if wet grinding is required, a coolant tank with an independent motor-driven pump, piping, fittings, and splash guards can be supplied as extra.

Powdered Oils for Cutting and Grinding Operations

Designated as Powder'd Oil, a coolant medium designed in individual formulas for grinding and cutting operations has been announced by Henry E. Sanson & Sons, Inc., 145 Quaker Ridge Rd., Manhasset, Long Island, N. Y. Powder'd Oil for grinding is a free-flowing golden powder mixed generally in the proportion of 2 lb. of powder to each 50 gallons of water, producing a clear light green solution. According to the manufacturer, this coolant is applicable to 99 per cent of all grinding operations.

Powder'd Oil for cutting is also a free-flowing powder which is generally mixed in the proportion of 6 lb. of powder to each 50 gallons of water, also producing a clear light green solution. This mixture, it is claimed, is applicable to 98 per cent of all machining operations, including broaching, tapping, threading, and reaming. Powder'd Oil is said to be a stable solution, free of odor, rancidity, and gumminess.



Two-Piece Spherical Washer

A two-piece spherical washer for use in the construction of jigs and fixtures is now being offered by



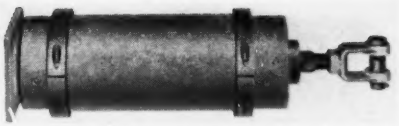
Drawing of Reid Two-Piece Spherical Washer

Reid Tool Supply Co., 709 Baker St., Muskegon Heights Mich. The washer is made of high-quality low-carbon steel, precision machined and case hardened. All sharp edges, it is claimed, are removed, and the washer is zinc plated for appearance and rust prevention. Eight sizes are available for use with bolts ranging from ¼ to 1 inch in diameter.

Double-Acting Air Cylinder Has Streamlined Construction

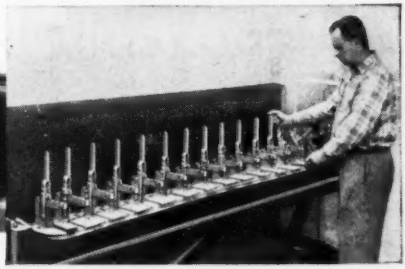
Designated as the Type "A," a double-acting air cylinder which features streamlined construction designed for space saving, easy maintenance, and durability has been announced by Westinghouse Air Brake Co., Industrial Products Division, Wilmerding, Pa. Cushioning at the end of the stroke is said to prevent noise and jarring by keeping the piston from slamming against the head of the cylinder.

The Type A cylinder is available in eight sizes ranging from 1½ to 10 inches in diameter with foot, flange, or pivot mountings for use on a wide variety of jobs.



Westinghouse Type "A" Double-Acting Air Cylinder





DESTACO HOLDS THE EDGE

Photos: Courtesy Holley Ski Co., Detroit, Michigan

Skiers know proper edging is most important for smooth slalom maneuvers. In production, precision tooling is necessary to obtain quality products. In the manufacturing of Plasti-Glass Skis the Holley Ski Company use De-Sta-Co's Model 620 Plunger Clamps to provide proper pressure during the slotting of the skis at a 22½ degree angle to allow for a patented moulded edge. Fifteen De-Sta-Co Model 110-C Toggle Clamps with Pressure-Matic adapters provide the necessary holding force to the welded angle plates which hold the ski in place during the cementing of the spring steel edges. Completely retractable the clamps allow easy insertion and removal of the skis from the drying fixture.

There's a De-Sta-Co Toggle Clamp engineered for your work-holding problems in assembly, welding, bonding, machining or inspection. Select from over 40 fixture and portable models. Positive holding pressures up to 4000 pounds. Write today for a copy of the De-Sta-Co catalog describing available stationary and portable toggle clamps.

DESTACO DETROIT STAMPING COMPANY

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UNIVERSAL DRILL BUSHINGS establish new standards of high quality

Universal Drill Bushings, produced at the big, modern plant of the Universal Engineering Company, have been first in industry for more than 25 years. They are accurately machined with superhoned bores from the finest quality steel. They are carefully inspected to insure maximum efficiency and extremely long life. Write today for complete information.



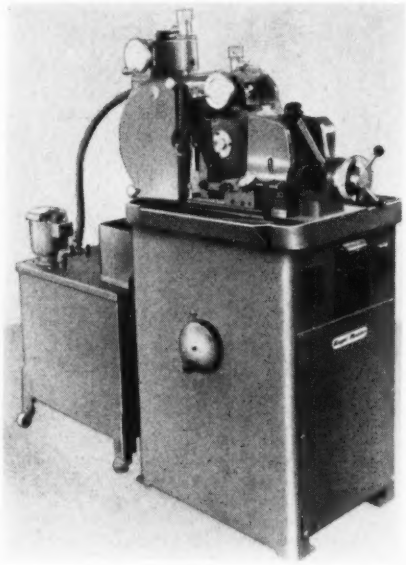
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UNIVERSAL ENGINEERING COMPANY
FRANKENMUTH 9, MICHIGAN
156-B

Centerless Grinder Handles 1/16 to 1-Inch Diameter Workpieces

Designated as the TG-123, a centerless grinder which is said to be capable of handling $\frac{1}{16}$ to 1-inch diameter straight or contour workpieces has geen announced by Royal Master Metal Products Co., State Highway 23, Riverdale, N. J. According to the manufacturer, a tolerance as fine as 0.0003 inch can be maintained, thus permitting low micro-finishes to be obtained.

A range of 30 to 480 r.p.m. of the regulating wheel spindle is provided through an infinitely variable speed drive which is said to eliminate the possibility of a gear tooth pattern on the work. The grinding wheel spindle is mounted on preloaded precision ball bearings, permanently lubricated at installation.



Royal Master TG-123 Centerless Grinder

A large, easy-to-read sizing dial permits setting in tenths; however, provision has been made for mounting a 0.0001-inch indicator. The coolant tank is a separate unit mounted on large casters. The grinder occupies 23 x 36 inches of floor space and is powered by means of a 3 h.p. motor.

Solid Lubricant Developed for Blind-Hole Tapping

Designated as "Hypertap," a lubricant which is extruded in solid stick form and is intended to assist in the tapping of threads in blind holes has been announced by Destiny Products Co., 8427 Mack Ave., Detroit 14, Mich. In application, a Hypertap stick, equal in diameter to the hole, is inserted in the hole prior to tapping. The tap is then brought down in the cutting action. In its descent through the hole, the tap exercises pressure on the lubricant, creating a hydraulic action which causes the lubricant to envelop the resulting chips, forcing the chip-laden lubricant up alongside the flutes of the tap and out of the blind hole.

According to the manufacturer, Hypertap is a non-corrosive water-insoluble compound which will withstand temperatures below 100 deg. F. The lubricant is available in diameters ranging from $\frac{3}{64}$ to 1 inch in standard lengths of 3½ and 7½ inches. Other diameters can be furnished on special order.



Destiny "Hypertap" Lubricant shown packaged and in use

Victor's Specials Deserve Your Attention!

High Speed S.S. END MILLS

FIRST QUALITY . . . SURPLUS STOCK!

DOUBLE END—2 OR 4 FLUTE



1/16 to 3/8 by 32nds.....$2.20
13/32 to ½ by 32nds..... 2.80

ALSO AVAILABLE . . . 2 and 4 Flute up to 2" Diameter Double and Single End!

SINGLE END—2 FLUTE

1/16 to 3/8 by 32nds.....$1.52
13/32 to ½ by 32nds..... 1.92



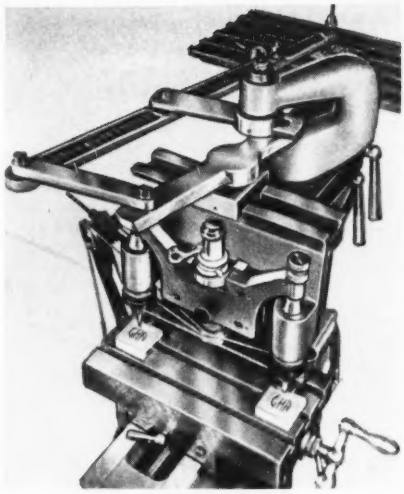
SINGLE END—4 FLUTE

3/32 to 3/8 by 32nds.....$1.40
13/32 to ½ by 32nds..... 1.80

VICTOR MACHINERY EXCHANGE, INC.
DEALERS IN TOOL ROOM EQUIPMENT
251-B Centre St. • New York 13, N. Y. • Phone: CAnal 6-5575

Engraving Machine Features Two Spindles

J. Arthur Deakin & Son, 150-28 Hillside Ave., Jamaica 2, N. Y., has introduced the Alexander Two-Spindle Engraving Machine which incorporates a pantograph that transfers the engraving movement from one master to two copying spindles which are held together by a unique spindle support. Two rigid roller slides, working at right angles to each other, are said to provide the movement for the spindles, permitting spindle sensitivity and producing accurate engraving.



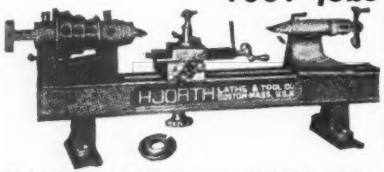
Alexander Two-Spindle Engraving Machine

Both cutters are set on the same plane. The spindles, it is claimed, can be adjusted individually and instantly to equalize the depth of cut. Coarse and fine adjustments for both spindles are controlled by a single lever. The maximum working area for each spindle is 4 x 4 inches, and the distance between the spindles is 9 inches.

Carbide-Tipped End Mill Is Capable of Penetrating End Cutting

A three-fluted center-cutting carbide-tipped end mill which is said to be capable of penetrating end cutting, as well as

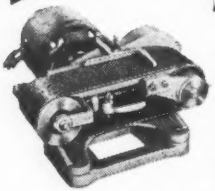
. . . for more than 1001 jobs



HJORTH LATHE & TOOL CO.
8 BEACON STREET WOBURN, MASS.

DOES IT BETTER
DOES IT FASTER

SIMPLEX-M
ABRASIVE BAND GRINDER

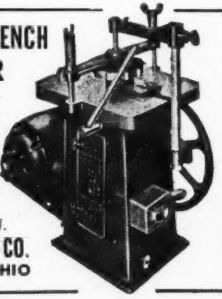


The precision of a machine tool plus the durability of a workhorse. Complete with ½ H.P. Heavy Duty Motor and automatic band tension control. Nothing like it for finishing metals, plastics, wood, fibre, etc.

OTHER STYLES AND SIZES IN NEW MANUAL ON FINISHING—WRITE TODAY

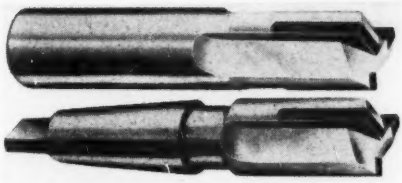
WALLS SALES CORP.
333 Nassau Avenue, Brooklyn 22, N. Y.

READING BENCH KEYSEATER



Portable—move directly to job; a time saver for both small and large shops.
3¾" stroke; adaptable for other work.
Low first cost — prompt delivery.
Good dealers wanted.

READING MACHINE CO.
CINCINNATI 37, OHIO



Super Carbide-Tipped End Mills

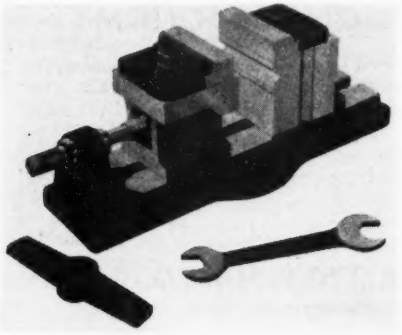
routing, has been added to its line by Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich. The tool is specifically designed for non-ferrous metals and non-metallic materials. The end mill is available with both straight and B&S taper shanks in six sizes from $\frac{3}{8}$ to $\frac{3}{4}$ inch, inclusive.

Vise Designed for Use on Drill Presses, Millers, Grinders, and Shapers

Brown Engineering Co., 120 N. Third St., Reading 2, Pa., has announced a versatile four-in-one vise which is said to reduce set-up time and minimize the use of jigs. Designed for use on drill presses, millers, grinders, shapers, and other machine tools, the vise contains all parts necessary for clamping workpieces securely and accurately with few adjustments.

The rear turret of the vise revolves, presenting four different faces for holding various kinds of work, including round, square, octangular, rectangular, flat, or angular-shape pieces in either a vertical, horizontal, or angular position.

Brown Utility Vise





There's modesty among taps, too, as well as tap manufacturers. The boys at Wood & Spencer's expect awards. They put everything they have into producing a tap for top tap performance and top tap efficiency. Send for Wood & Spencer's tap chart, showing complete tap operations . . . It checks for lubrication, spindle, alignment, etc. . . . It's a chart to stop your tapping troubles before they start and tells you how to use the right tap at the time, for greater tap life.

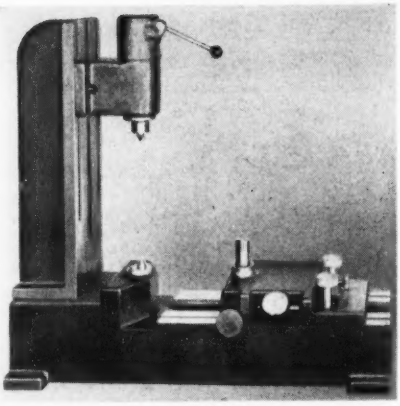
The Wood & Spencer Company
Cleveland 3, Ohio

Auxiliary jaws at the top of each turret can be spread at an angle to hold odd-shaped work. The unit is heavily constructed and is available in two sizes.

Rolling Fixture Checks Cluster Gears

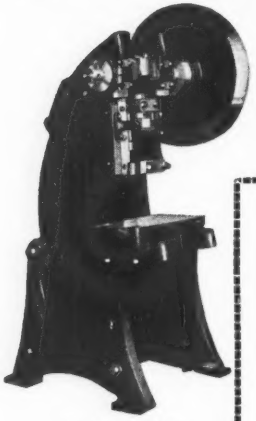
Designated as the Model 602-A, a bench-type rolling fixture which is designed to check size, eccentricity, and roll smoothness of cluster gears and similar types having integral shafts and centers has been announced by Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. The fixture features a heavy cast iron base, scraped ways, and hardened and ground ball ways. The unit incorporates a spring-return lever-controlled retractable upper center, and the center distance is adjustable from 2 to 10 inches. The maximum distance between centers on the overarm is 12 inches.

In operation, gears to be checked are loaded between centers on the overarm. The master gear is brought in to mesh with the gear being checked by an eccentric lever control. Correct tension between the gears is maintained by spring-loaded ball ways. Turning the gear manually causes a 0.0005-inch indicator to show the variations. The fixture measures 9½ inches wide x 29 inches long x 26¼ inches high and can be used in conjunction with the Michigan Model MTR-50 automatic recorder to place all readings on permanent charts.



Michigan Model 602-A Bench-Type Rolling Fixture

MARSHALLTOWN



OPEN BACK INCLINABLE

PUNCH PRESSES

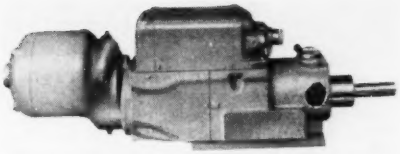
Soundly Engineered — Ruggedly Built for PRECISION & ECONOMY

- All bearings honed to exact sizes, guaranteeing perfect fit and alignment.
- Matched unit slide and gibs pre-finished by precision lapping with newly developed process.
- Chrome molybdenum cranks, wrist pin connections.
- Easy to maintain — economical to operate.
- 5 to 70 tons capacity.
- 9 models.

Write today for literature

MARSHALLTOWN MFG. CO.
MARSHALLTOWN, IOWA

Hydraulic Drill Unit Features 6-Inch Stroke and 1,800-Lb. Thrust



Delta No. 19-600 Hydraulic Drill Unit

Designated as the No. 19-600, an air-powered hydraulic drill unit which is designed for heavy-duty drilling, tapping, reaming, spot-facing, hollow milling, and similar operations has been announced by Delta Power Tool Division, Rockwell Mfg. Co., Dept. HD-H29, 400 N. Lexington Ave., Pittsburgh 8, Pa.

The unit, the manufacturer claims, has a maximum stroke of 6 inches, an 1,800-lb thrust with 80 p.s.i. air pressure, and can accommodate up to a 5 h.p. motor and a 1⅛-inch drill. The standard spindle of the unit has a No. 4 Morse internal taper.

The length of stroke is controlled by means of a positive micrometer stop which is said to be infinitely adjustable from 0 to 6 inches, and depth can be held to within a 0.0005-inch tolerance. Rapid approach, is at a maximum rate of 5 inches per second, with infinite adjustment in length up to the full stroke of the unit by means of a positive stop. The rapid return has a maximum rate of 4 inches per second. According to the manufacturer, the feed rate can be adjusted infinitely from 0 to 180 inches per minute, and a backfeed valve, for locking out the rapid return, permits using the feed adjustment on the return stroke for back spot-facing and similar jobs. Built-in switches permit interlocking of the Delta No. 19-600 Drill Unit with other drill units or equipment.

SAVE 3 WAYS

WITH



1 SAVE with a Lucifer Electric Furnace on FIRST COST. Our straight line production permits economical selling price, despite use of highest quality materials throughout. Check costs on other furnaces . . . feature by feature . . . you'll save money on the Lucifer Electric Furnace EVERY TIME.

2 SAVE ON MAN HOURS with a Lucifer Electric Furnace. Less operator attention needed — Lucifer controls are EXACT. They reach SPECIFIED heat rapidly and retain SPECIFIED temperature without variation. No special experience required when you use a Lucifer Furnace.

3 SAVE on maintenance expense with a Lucifer Electric Furnace. Finest refractory materials are built into Lucifer Furnaces for better, more efficient heat retention. Elements are guaranteed . . . long lived . . . trouble free. You save three ways with a Lucifer Electric Furnace. More than two thousand satisfied users.

CHECK THESE PRICES

Furnace Size	*2000′*	*2300′*
6x 6x12″	$467.00	$548.00
9x 9x18″	647.50	764.00
12x12x24″	912.00	1068.90
18x18x36″	1419.75	1629.50

Complete with 100% automatic electronic controls.

FREE

WRITE for FREE literature, specifications and price list of Lucifer Furnaces in wide range of sizes—top loading and side loading types. Engineering advice without obligation.

Write, wire or telephone TODAY.

GILBERT S. SIMONSKI COMPANY

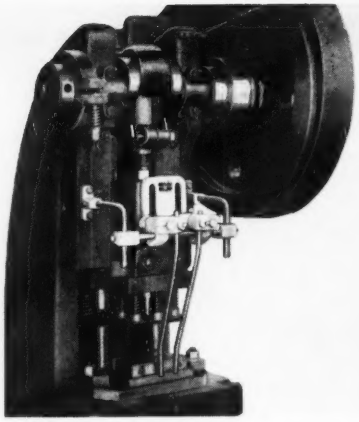
Route No. 611 Neshaminy 10, Pa. Phone Hatboro 0411

Sole Manufacturers of Lucifer Electric Furnaces

Safety Guard Is Designed for Power Presses

A safety guard for forming and secondary operations on power presses with up to a 4-inch stroke has been announced by Cooper Weymouth, Inc., 277 Noble Ave., Bridgeport 8, Conn. With a sweeping motion, the two guard arms, which are actuated by the press ram, push the operator's hands safely away from the danger area as the ram starts to descend.

According to the manufacturer, the operator's field of vision is unobstructed by the guard arms which may be arranged in a wide variety of ways to suit specific applications. The arms can be formed so as to sweep directly over the lower die or to guard the front, back, or side of the die, as well as to provide a combination of these positions.



Cooper Weymouth Safety Guard installed on power press

Boring Machine for Jet Engine Compressor Cases

Designated as the Alfing Model HF/1150, a fine boring machine specially built for the complete machining of a jet engine compressor case is now being marketed by Morey Machinery Co., Inc., 410 Broome St., New York 13, N. Y. The machine is designed in two pieces. The boring bar is of rigid design with a temporary support during loading, and the toolslides are mechanically actuated and hydraulically controlled.

Both halves of the housing are clamped

CAMS

MADE TO YOUR SPECIFICATIONS

LET US HANDLE YOUR CAM PROBLEMS

BLOOMFIELD TOOL CORPORATION

37 Farrand St. Bloomfield, N. J.

For Cooler, Check-free Grinding use

Model No. 4 Hand Dresser For Pedestal Grinder



NEWMAN DRESSERS

Models for every type of wheel dressing. Proven best for dressing diamond wheels. Replacement wheels available for all models.

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SUPEREAM

REAMERS IN *Decimal* SIZES

▼ FROM .032 all the way up—Blanks can be ground to your exacting specifications and delivered in approximately 10 days. By purchasing SUPEREAM REAMERS in steps of .001 you SAVE—Time, Labor and Money in the cost of extra machining and lapping. SUPEREAM REAMERS all have ground and polished flutes and are held within .0002 tolerance.

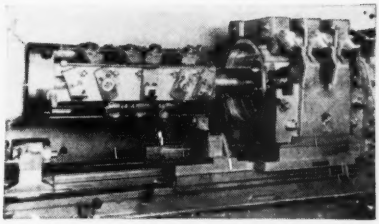
REAMERS are also furnished in Right-hand spiral, right-hand cut, as well as Left-hand spiral, right-hand cut.

• In Emergency phone Libertyville 2-4200

Write for descriptive literature and prices.

TWENTIETH CENTURY MANUFACTURING CO.

Box 429-M, Libertyville, Ill.



Alfing Model HF/1150 Fine Boring Machine

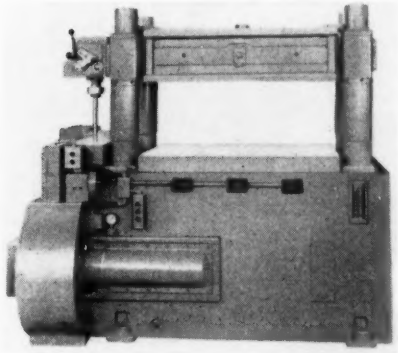
in the fixture by a series of self-locking spring-loaded blocks. The carriage then advances the work over the boring bar. The boring bar is inserted in an outboard support bearing, and the temporary support is retracted. Cylindrical, tapered, or combined bores, end faces, T-slots, and other grooves can be machined. Boring bar design is said to permit considerable adjustment for design changes.

100-Ton Die Tryout Press

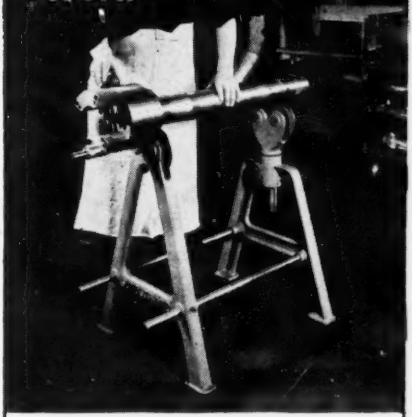
Alpha Tool Works, 9281 Freeland Ave., Detroit 28, Mich., has announced a 100-ton die tryout press which has a 6-inch stroke and which is said to operate efficiently at 50 strokes per minute. According to the manufacturer, the head of the press can be quickly released and rotated to any point up to 240 degrees, thus permitting the operator to barber, spot, shear, fit, and finish both the punch and the die without removing the die from the press. Capacity, it is claimed, can be figured at pinpoint tonnage at any one point in the bed.

Four-post construction is said to assure

Alpha 100-Ton Die Tryout Press



Balancing Tools for a Wide Range of Work



Here's a complete line of Balancing Tools which will save their cost quickly on balancing or truing operations. Accurately sensitive and durable, they provide a simple, reliable means for checking the balance of parts like gears, shafts, fly wheels, pulleys, etc. The standard sizes available are shown in capacity chart below.

CAPACITIES

Swing	Between Standards	Weight Capacity
21 in.	20 in.	12 lbs.
21 in.	20 in.	800 lbs.
43 in.	29 in.	800 lbs.
43 in.	29 in.	2,000 lbs.
6 ft.	5 ft.	5,000 lbs.
8 ft.	8 ft.	10,000 lbs.
Any	Any	24,000 lbs.
43 in.	30 in.	800 lbs.

FREE DATA



SUNDSTRAND

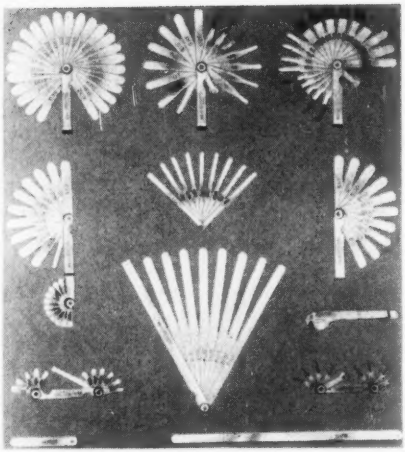
You can obtain complete information on Sundstrand Balancing Tools by writing for bulletin 529.

SUNDSTRAND MACHINE TOOL CO.
2539 Eleventh Street, Rockford, Ill., U.S.A.

accurate alignment of both the punch and the die. The drive mechanism is housed in the base and pulls the head down. The press incorporates an air clutch which is a combination air-operated flywheel type with a multiple-disc brake. The electrical controls of the clutch are said to permit inching, single-stroke, continuous, and forward or reverse operation.

Feeler Gage Blades

An assortment of 27 sizes of feeler gage blades, 10 feeler gage sets, and a feeler gage dispenser have been announced by J. H. Williams & Co., 400 Vulcan St., Buffalo 7, N. Y. All blades are made of selected Swedish steel, properly tempered. Each blade is electro-etched with its decimal size and is treated with rust-resistant oil. Individual blades from 0.0015 to 0.040 inch are packaged in envelopes of six blades and are available in 3½ and 12-inch lengths.



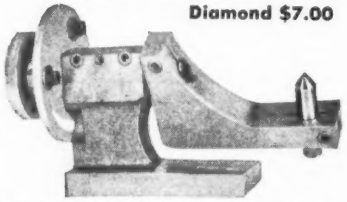
Williams Feeler Gage Blades and Sets

Feeler gages are also available in a variety of sets containing combinations of sizes for special use. Sets have knurled lock nuts which allow the user to select the required blade size and then lock it. A feeler gage dispenser with an assortment of blades and sets is also available.



Get a better "SURFACE GRINDER" job at less cost
ORDER DIRECT on our 10 day money back guarantee

RADIUS DRESSER $39.00
Diamond $7.00



Hardened shaft—Bearing adjustable for wear. Diamond always perfectly centered. Easily set adjustable 180° stops.

10" Wheel size for DoALL and NORTON Grinders—$44.00. Diamond $7.00.

SPECIAL 20" Wheel Size $110.00.

ANGLE DRESSER $44.00
Diamond $7.00



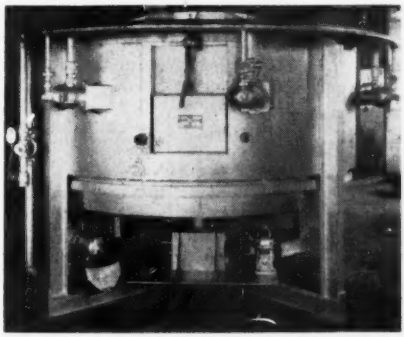
Ball Thrust Bearing. 24 Precision Ground Surfaces. Can be set very accurately with a Protractor or Sine Bar. Works underneath the wheel. Large bearing surfaces.

THE "MIGHTY MIDGET" LINE

SPERMAN METAL SPECIALTIES • 2199 E. 21ST ST. • BROOKLYN 29, N. Y.

Gas-Fired Rotary Hearth Furnace

A gas-fired rotary hearth furnace which has a hearth measuring 7 feet 6 inches outside diameter with a 30-inch column has been announced by Waltz



Waltz Gas-Fired Rotary Hearth Furnace

Furnace Co., Dept. D, 1901 Symmes St., Cincinnati, Ohio. The center column on the hearth of the furnace forms a doughnut-shaped heating chamber which is 15 inches high. The burners of the unit fire tangentially to the inner lining and against the direction of the table rotation.

The furnace is controlled by means of a Leeds & Northrup strip-chart controlling instrument. The drive mechanism and blower are mounted on the base of the furnace, making the entire furnace self-contained. The furnace is said to be ideally suited for continuous operation for either forging or heat treating and can be operated at temperatures of 1,200 to 2,300 deg. Fahrenheit.

Wheel Dresser Features Detachable Micrometer Base

Designated as the "REC," a wheel dresser which, it is claimed, features a detachable micrometer base, thus facilitating cylindrical and surface grinding operations up to 0.0001-inch accuracy, has been added to its "Fluidmotion" line by J & S Tool Co., Inc., 645 W. Mt. Pleasant Ave., Livingston N. J. According to the manufacturer, the unit can also be used for under-the-wheel dressing operations. The angles are dressed by continuing to push the handle in either or both directions after the radius is formed. The diamond automatically returns to the center position after dressing the angles.

Drill More Holes Per Hour
In ANY Pattern... On ANY Drill Press

Adjustable
with a MULTI-DRILL

Drills 2 to 8 holes at one stroke



model **900**

Increase production up to 800% . . . save time, cut costs. MULTI-DRILLS make *any* drill press produce *more*. Attached without alterations or special tools. Quick, easy setups of universally adjustable spindles give you more flexibility . . . wider application. Handles any hole pattern within 9" circle; centers close as ½" Extension Spindles available to increase working area to 22½". Special adaptations available.

DRILLS ANY HOLE PATTERN

COMMANDER MFG. CO.
4224 W. Kinzie St. Chicago 24, Illinois

See your Commander Distributor for complete details. Write for the NEW Commander Full Line Catalog No. 851.

Product of *Commander* . . . Builder of Production Tools

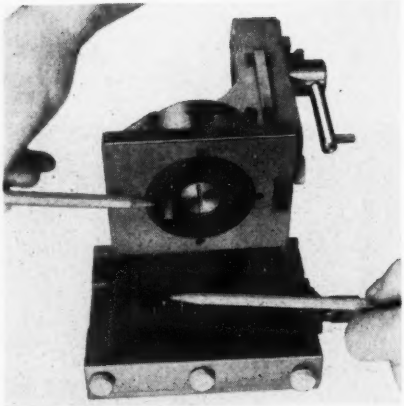


is the **ONLY** *Center*
with the
OVERLOAD INDICATOR
Look for the **RED BAND**

You no longer have to guess whether you are overloading your live center thrust bearings if you use MOTOR TOOL LIVE CENTERS. When the load is too great the RED BAND around the spindle disappears into the housing. You can see at a glance when overloading occurs. This is an exclusive feature, developed by Motor Tool which cuts repair costs to practically nothing if due diligence is exercised. As long as the RED BAND is visible you are running COOL and SAFE.

Send for
NEW descriptive folder . . . and *verified* case histories of how MOTOR TOOL LIVE CENTERS have *out-performed* and *outlasted* ALL other centers on exceedingly tough, continuous-run jobs.

MOTOR TOOL MFG. CO.
P.O. BOX 3805 PARK GROVE STATION DETROIT 5, MICH.
Makers to Call Motor Tool



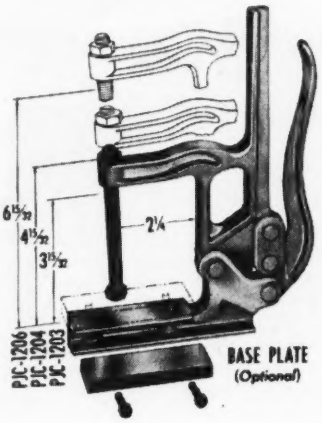
J & S "REC" Wheel Dresser

The dresser is made of high-carbon, high-chrome, hardened, ground, and lapped steels—highly resistant to abrasive action. The unit, it is claimed, contains no wearing surfaces. The moving parts swivel on stainless steel ball bearings.

Toggle Clamps Have Range from 1-11/16 to 6-15/32 Inches

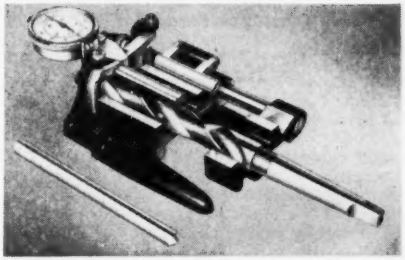
Eight new toggle-clamp models of the plier type, five having horizontal handles and three having a vertical handle, have been added to the Knu-Vise line by La-

Knu-Vise Series PJC Toggle Clamp



peer Mfg. Co., 3048 Danison Rd., Lapeer, Mich. Designed primarily for use in toolrooms where individual clamps having a large thickness capacity are required, the clamps have long, thick, flat bases with an extra base plate available as optional equipment.

The clamps are available in two series. The PJP series provides a clamping range of from 1⅛ to 6⅛ inches with throat capacities of 1¼ to 2¼ inches. The PJC series has a range from 3⅛ to 6⅛ inches with a throat capacity of 2¼ inches. In each type of clamp, the base plate is available in either soft metal, which is easily adapted to individual needs and furnished with two bolts for attaching, or in hard metal, already installed. Each type base plate, including the parallel jaw, measures 1 inch in thickness. The spindles, which are adjustable for height, are provided with nuts for locking in position.



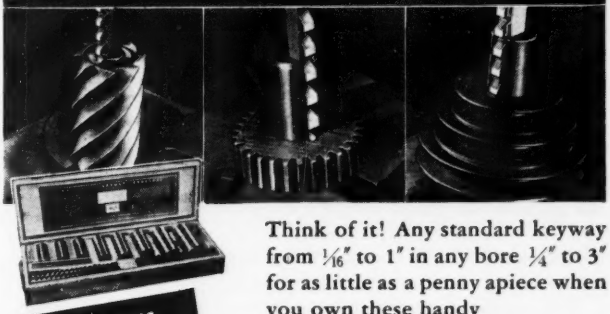
"Matrix" Drill Point Measuring Instrument

Gage Checks Twist Drill Points

Designated as the "Matrix," a drill point measuring instrument which is said to quickly check correct drill point angle and its centrality has been announced by Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill. Two vees support the straight or tapered shank drill, and centrality is read directly to 1 degree on an indicator dial.

The instrument is available in a ¼ to ¾-inch size and in a ¾ to 2½-inch size. Setting standards are supplied for standard drill point angles.

KEYWAYS FOR SALE 1¢ Each



Think of it! Any standard keyway from 1/16" to 1" in any bore ¼" to 3" for as little as a penny apiece when you own these handy

du MONT *Minute Man*® KEYWAY BROACHES and SETS

CLIP THIS COUPON FOR FREE CATALOG and PRICE LIST

The du MONT CORPORATION, Greenfield, Mass.

SEND FREE CATALOG and PRICE LIST S -covering all Minute Man Keyway Broaches and Kits to:

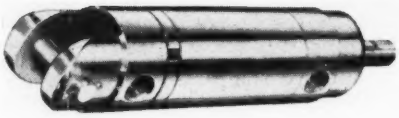
Name .....

Company .....

Address .....

Air Cylinder Features Design That Eliminates Tie Rods and Reduces Head Size

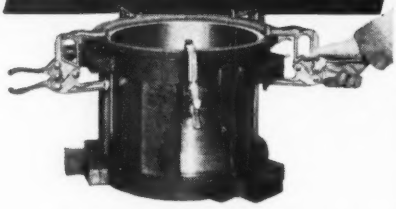
Designated as the T-J "Spacemaker," an air cylinder featuring a design which is said to eliminate tie rods and reduce head size has been announced by The Tomkins-Johnson Co., Jackson, Mich. The cylinder consists of a solid steel head and a heavy-wall seamless steel body. The cylinder is equipped with T-J's Super Cushion Flexible Seals which are said to ensure positive cushion with automatic valve action for fast return stroke. According to the manufacturer, relative port positions may be rotated without disassembly of the cylinder and locked as desired.



T-J "Spacemaker" Air Cylinder

Adequate port sizes are said to allow for maximum speed and power with a minimum friction loss. Standard piston rod diameters are consistent with intended use and desirable stroke length. The Spacemaker line is furnished in many standard sizes and styles, both cushioned and non-cushioned, for a wide range of pushing, pulling, lifting, clamping, or control jobs.

4 times as many cylinders now welded by using KNU-VISE CLAMPS





These *KNU-VISE* pre-set clamps* permit job to be set up now in one quarter the time—thus converting this saving of time into increased production.

Each set-up consists of clamping a ring to top of aluminum cylinder preparatory to welding.

Besides achieving faster set-up, the *KNU-VISE* clamps present no interference to the welding operation as do old style clamps which had to stick up above the work to accomplish the clamping with greatest speed.

Send for our complete catalog.

*PHOTOS, COURTESY CADILLAC WELDING CO., DETROIT, MICH.

KNU-VISE PRODUCTS **LAPEER MFG. CO.**

3048 DAVISON ROAD • LAPEER, MICHIGAN

WESTERN DIVISION: 422 MAGNOLIA ST., GLENDALE, CALIF.

Contour Tooth Slotter

Gay-Lee Co., Clawson, Mich., has announced the development of a method by which it can now supply its "Thinsaw" slotter with contour tooth forms, thus



Gay-Lee Contour-Tooth "Thinsaw"

enabling the user to employ carbide with its long life and high speeds in cutting slots that require a form. A wide variety of convex forms, including radius and radius with angles tangent and their variations, can be produced to user specifications.

"Thinsaw" carbide tips are brazed into a circular pocket, and this type slotter is available in diameters up to 8 inches in thicknesses of 0.030 inch up. Solid carbide saws are available from 0.020 inch up. Either type can be produced with contour tooth forms.

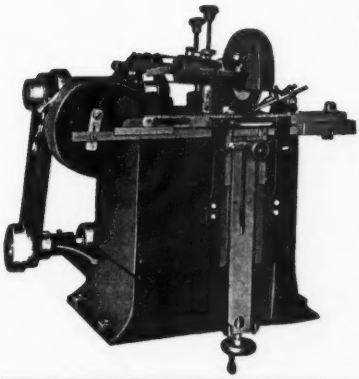
Device Is Designed for Corrective Balancing Operations

Taylor Dynamometer & Machine Co., 538-M W. Highland Ave., Milwaukee, Wis., has announced the production of a unit for milling operations which are required to make corrections on piece parts that are to be put in balance. The arrangement consists of a milling attachment mounted on a sturdy, ground work table with a coolant trough. The fixture for the piece part to be corrected is mounted on ways and moved against an end mill in the milling attachment. A manual feed screw with a graduated collar for measurement of stock removal provides for quick and simple operation. The unit is designed for use with Taylor "Hi-Eff" Balancing Machines.



Illustration showing Taylor Corrective Balancing Device together with Taylor "Hi-Eff" Balancing Machine

Here's the sharpener that triples your saw mileage



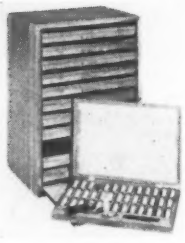
E C Automatic Combination Hack —Band—Circular Saw Grinder

An exclusive feature enables one grinding wheel to sharpen and shape a variety of teeth without changing shape of wheel.
This grinder sharpens and reclaims hack saws that would otherwise be discarded.

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Maker of largest line of saw and tool sharpening machines



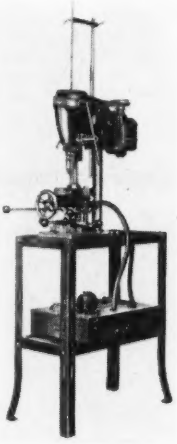
Size Control Gage Cabinet

Cabinet for Gage Sets

Size Control Co., Division of American Gage & Machine Co., 2500 W. Washington Blvd., Chicago 12, Ill., has announced a new-style mahogany cabinet which will accommodate any of its gage sets. Space is provided in each cabinet for separate collets to fit a universal handle for each plug member in class XX, X, Y, and Z accuracies. Available are reversible plain sets in number, fractional, or letter sizes complete in cases; reversible thread sets in any combination of reversible standard thread sizes, National and Unified series; and reversible special sets in any combination desired.

Turning Attachment for Use on Lathes and Drill Presses

Turnomat Co., Inc., Dept. 14, Brockport, N. Y., has announced an attachment for lathes and drill presses that enables turning to small diameters in one plunge cut and to almost unlimited lengths. The attachment, it is claimed, can also be used to taper, knurl, center, form, thread, drill, and ream. The unit has a capacity for up to 1¾-inch bar stock and utilizes four quickly interchangeable heads.



Turnomat Turning Attachment mounted on drill press

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Do you buy or specify cutting tools and wear-resistant parts? You'll find this Gorham Tool Catalog a *helpful time saver!* Its 120 pages are packed with useful cutting tool information . . . plus a valuable section of Engineering Data. Request your free copy on company letterhead. In *special* tooling problems, consult your nearby Gorham field engineer. His counsel is yours for the asking, and it's backed by Gorham's 35 years' experience in the design and production of fine cutting tools. Write for his name.

Gorham TOOL COMPANY

"EVERYTHING IN STANDARD AND SPECIAL CUTTING TOOLS"

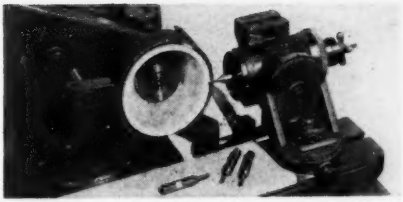
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WEST COAST WAREHOUSE: 576 North Prairie Ave., Hawthorne 4, Calif.

Sharpening Attachments for Small End Mills

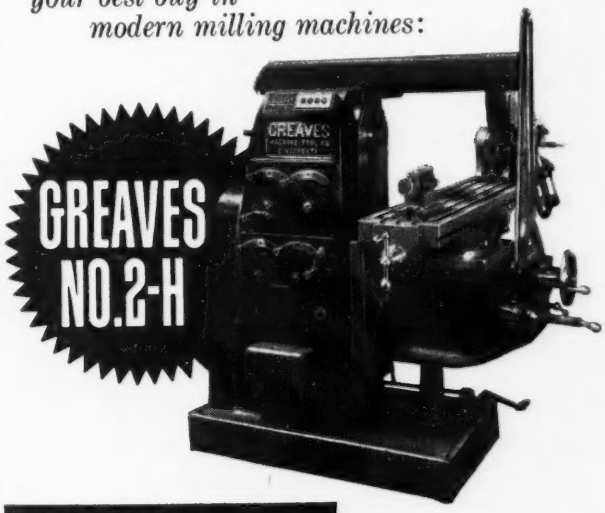
Designated as the Nos. 5 and 10 N, two sharpening attachments designed for use on the Nos. 5 and 10N B&S Cutter and Tool Grinding Machines, respectively, for sharpening the peripheral and end teeth of straight shank end mills from $\frac{1}{8}$ to $\frac{5}{8}$ inch in diameter has been announced by Brown & Sharpe Mfg. Co., Providence 1, R. I. According to the manufacturer, the attachments utilize sensitive free-running spindles which are said to be ideal for sharpening very small end mills having steep spiral peripheral teeth. The spindles are mounted on ball bearings and have a No. 7 B&S taper hole.

In operation, the tooth being sharpened is held in contact with the tooth rest while feeding the cutter across the wheel by longitudinal table movement. A small knurled diameter at the end of the draw-in bolt provides unusually sensitive control of the work. On the No. 5, the attachment spindle is carried in a body that is fastened to the center head furnished with the machine, thus permitting setting to an angle in both a horizontal and vertical plane with rigid clamping provided for both adjustments. On the No. 10N, the attachment spindle is carried in a body that is fastened to the machine work head knee by means of a plate and bolt. Settings, it is claimed can also be made in a horizontal and vertical plane with the No. 10N.



Brown & Sharpe No. 5 Sharpening Attachment in use on a B&S No. 5 Cutter and Tool Grinding Machine

your best buy in modern milling machines:



Plain or Universal

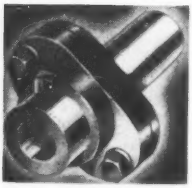
- **Offers every modern milling machine advantage:** 18 spindle speeds 25 to 1250 rpm, 18 feeds $\frac{1}{2}$" to 30" per minute, rapid traverse, Timken bearings and many others.

You can't buy a better combination of simplicity, rugged construction, ease of operation, accuracy and production speed.

Send for bulletin and price list.

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THE GREAVES MACHINE TOOL CO.
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Boyar-Schultz Releasing-Type Tap Holder

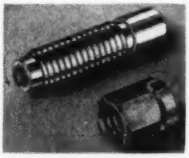
Releasing-Type Tap Holder

Boyar - Schultz Corp., 2120 Walnut St., Chicago 12 Ill., has announced a releasing - type tap holder which is said to provide correct alignment of taps between turret and spindle. The tap holder is available in five sizes to fit a wide variety of hand screw machines and turret lathes.

The body and head of the holder are forged to provide maximum strength and durability. According to the manufacturer, the tool can be easily changed for right or left-hand tapping. The releasing mechanism is enclosed for protection and is said to permit accurate control of tapping depth.

Swivel-Shoe Set Provides Positive Holding of Parts without Marring Surfaces

A swivel-shoe set which is said to be unusually simple to use and is adaptable to practically any type of tool, jig, or fixture has been announced by Allied Air Parts, 662 N. Robertson Blvd., Los Angeles 46, Calif. According to the manufacturer, the set provides positive holding without marring scratching, or burring the part being held. All parts of the set are machined to ensure concentricity of shoe and pitch diameter of the screw.



Allied Swivel-Shoe Set

The swivel-shoe set is available in two types; namely, in a hexagon swivel type (H-S Series) which is adaptable to any length screw and in a swivel set (S-S Series) which is a socket-head screw with a swivel shoe attached for use in tight quarters.

Deburring with NOBUR tool

on drill press reduces production costs . . . speeds deliveries!

MEMO

TO: Planning Dept.

FROM: Methods Engineer

NOTE: 75% saving in time on Op. #4 and 16% in overall time.

Lets take fuller advantage of NOBUR

FG. CO.

OUTLINE

OPER NO	MACHINE	DESCRIPTION	TIME
1	TURRET	BORE & FACE PER PRINT	5 MIN
2	MILL	STRADDLE MILL PER PRINT	3
3	DRILL	10 HOLES LINE DRILL	6
~~4~~	~~BENCH~~	~~DE-BURR HOLES~~	~~4~~
4 (REV.)	NOBUR TOOL IN DRILL PRESS	NOBUR HOLES	1
		TOTAL	18 15

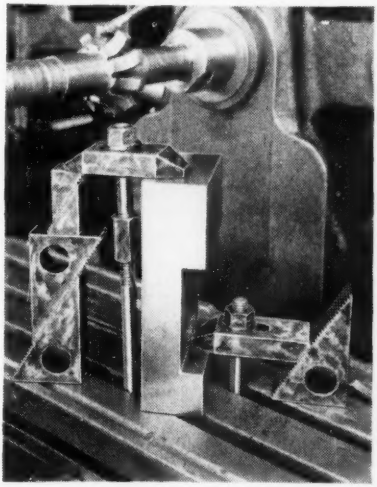
For further information, write or wire today

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Strap Clamp

Northwestern Tool & Engineering Co., 119 Hollier Ave., Dayton 3, Ohio, has added to its line of set-up tools a strap clamp which is said to be ideal for the press-room, toolroom, and other production departments. The clamp is designed for rigid clamping and is beveled on the nose to provide cutter clearance. The clamp is furnished in plain and step types, and



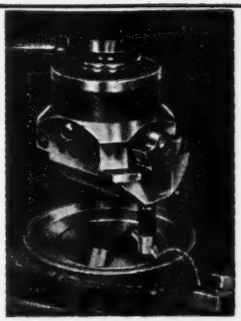
Northwestern Strap Clamps in use

is available in lengths of 2½, 4, and 6 inches to accommodate studs ranging from ⅜ to ¾ inch in diameter.

Water-Type Coolant Contains Wax

Designated as Johnson's No. 130 Wax-Cool, a water-type coolant which contains wax, for use in metal-working machines requiring water-soluble coolants, has been developed by S. C. Johnson & Son, Inc., Industrial Products Dept. MMS, Racine, Wis. According to the manufacturer, the coolant has unusual lubricating properties and minimizes heat at its source, thus extending tool life and providing a good finish on metals.

Wax-Cool is a wax-fortified water emulsion and is said to provide the same "wax" advantages as Wax-Cut, the company's oil-type coolant containing wax. Wax-Cool is available as a concentrate and should be mixed with 20 parts water before use.



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ONE Set Up

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CUTTING TOOL SPECIALISTS

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Improved Rotary Broach Maintains Tolerance of Plus or Minus 0.0001 Inch

An improved rotary broach which is said to finish holes to an accuracy of plus or minus 0.0001 inch is now being marketed under the trade name Fearless by Shearcut Tool Co., Dept. MM72, 7041-7045 Darby Ave., Reseda, Calif. According to the manufacturer, the broach removes the metal by a true shearcutting action which forces the chip being removed ahead of the tool, thus eliminating any chances of the chip scaring the hole being finished. The tool is made of high-speed steel, ground from the solid after hardening. The cutting edges of the tool form a circle, providing a long cutting edge. The broach, it is claimed, can be resharpened from 10 to 30 times before the diameter is reduced to a point where an undersize hole is produced.



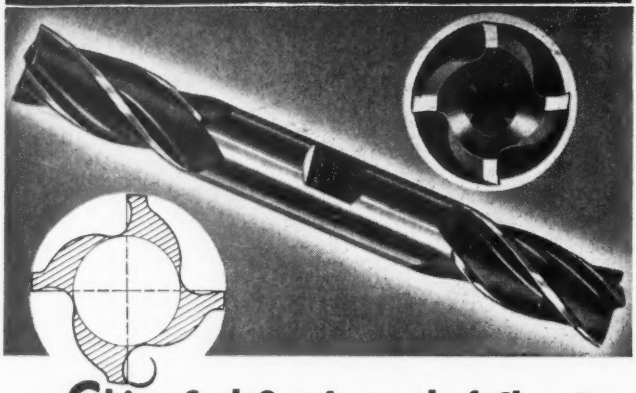
Fearless Improved Rotary Broach

Previously manufactured in sizes from ¼ to 1 inch in $\frac{1}{16}$-inch increments and from 1⅛ to 1½ inches in ⅛-inch increments, the improved rotary broach is now available in all sizes from $\frac{1}{16}$ to 3 inches in $\frac{1}{64}$-inch increments.

Lithium Grease

Designated as Alvania, a lithium base grease whose unique multi-purpose properties are attributed to the use of lithium 12-hydroxy stearate, providing unusually high resistance to breakdown, has been announced by Shell Oil Co., 50 W. 50th St., New York 20, N. Y. According to the manufacturer, the grease has a high water tolerance, a broad temperature range, and an ability to achieve pumpability and movement at low temperatures. It is also claimed that the grease undergoes no phase change as temperature rises to the high melting point. Alvania has a low rate of oxidation and a long induction period, as well as excellent storage stability.

YESTERDAY'S PIONEER · · · TODAY'S LEADER



Chips Curl Out Instead of Clogging with WELDON Cupped-End End Mills

● Over twenty-five years ago Weldon opened the door to higher speeds and faster feeds by developing a scientifically designed end mill tooth. This hollow ground tooth with its curved cutting face allows the chips to *curl* out without clogging. A further means to this purpose is the Weldon "cupped-end" which prevents chips from clogging the end teeth because it eliminates pockets which trap chips.

Another special feature originated by Weldon is the double back-off on the tooth, which gives greater support to the cutting edge, prolonging the life of the tool.

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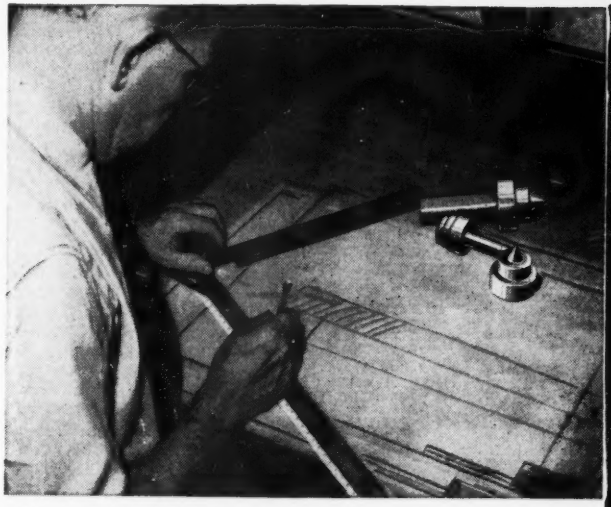
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STRAIGHT OR INVERTED-TAPER SHANKS
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UP-CUT OR DOWN-CUT SPIRAL
FULL LINE OF STRAIGHT-FLUTE ROUTER BITS

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NEW SHOP LITERATURE

Automatic Lathe. A 20-page two-color catalog (Form 1159) released by Gisholt Machine Co., Madison 10, Wis., fully describes and illustrates its "Simplimatic" Automatic Lathe which is said to be ideally suited for medium to long runs. Thirty-one tooled applications are shown in the catalog covering everything from flywheels to rear axle housings.

Permanent Magnets. A "one a month" information kit describing permanent magnet application ideals for industry has been released by Carboloy Department of General Electric Co., 11143 E. 8 Mile Rd., Detroit 32, Mich. The kit consists of a heavy permanent binder with six application ideas, each described on a separate loose-leaf page. Each month, Carboloy plans to issue a new magnet application sheet which will be distributed automatically to those who request the basic information kit. The first six ideas presented are use of magnets on conveyors to transport ferrous parts, sheet steel separators, floor sweepers to pick up ferrous objects, plant layouts, tool racks, and shear tables for cutting sheet metal. Each idea sheet contains complete technical information and diagrams regarding the particular applications described.

Hardness Conversion Chart. Clark Instrument Inc., 10204 Ford Rd., Dearborn, Mich., has issued an accurate hardness conversion chart for use wherever hardness testing is done. The chart is printed on heavy stock and is convenient for wall mounting.

Lubricant. A four-page two-color leaflet released by The Alpha Corp., 174 Hamilton Ave., Greenwich, Conn., describes the advantages of Molykote-Centerlube as a dead center and steady rest lubricant for lathe operations, as well as its versatility in such applications as press fitting, heavily-loaded gears, ways of machine tools, and many others.



Screw Fasteners. In conjunction with the new net pricing policy announced by The Holo-Krome Screw Corp., Hartford 10, Conn., the company has published two booklets, one intended for the use of industrial consumers and the other to be used by the firm's own authorized industrial distributors. Each booklet gives net prices for all standard items in the Holo-Krome screw fastener line and includes simple directions whereby the original list prices may be determined from those given. Since Holo-Krome products are distributed only by the firm's own authorized distributors, industrial users who wish to obtain a copy of the new 20-page booklet, available to users of socket screw products, are advised to contact the Holo-Krome distributor in their area.

Rotary and Adjustable Tilting Tables. The John B. Stevens Co., Main St., Somersville, Conn., has released an eight-page two-color bulletin describing and illustrating its line of rotary tables and adjustable tilting tables which have a wide range of usefulness in toolrooms, model shops, job shops, and regular production departments. Complete specifications are included.

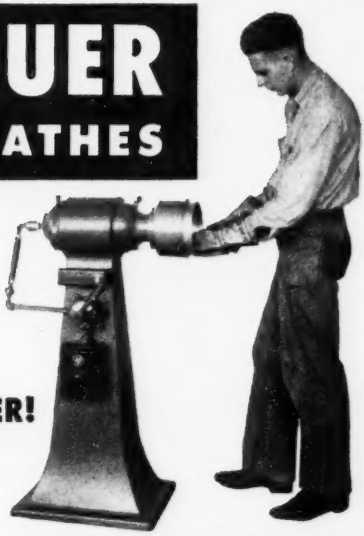
Air Power Equipment. A 56-page two-color 1953 Air Power Catalog released by Mead Specialties Co., Dept. P-42, 4114 N. Knox Ave., Chicago 41, Ill., describes and illustrates its entire line of single and double-acting air cylinders and air-operated presses, vises, chucks, valves, hammers, and work feeders.

Bench-Type Miller. A four-page two-color folder released by The Barker Engineering Co., 500 Green Rd., Cleveland 21, Ohio, describes and illustrates its bench-type miller which is designed to perform a wide variety of precision operations. Various applications are shown, and specifications are included.

Gear Production Methods. National Broach & Machine Co., 5600 St. Jean, Detroit 13, Mich., has compiled a four-page two-color bibliography for the convenience of those responsible for gear production. Information regarding the basic facts on gear tooth crowning is included.

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Polishing cooking ware is just one of many *jobs performed by Schauer Speed Lathes.*

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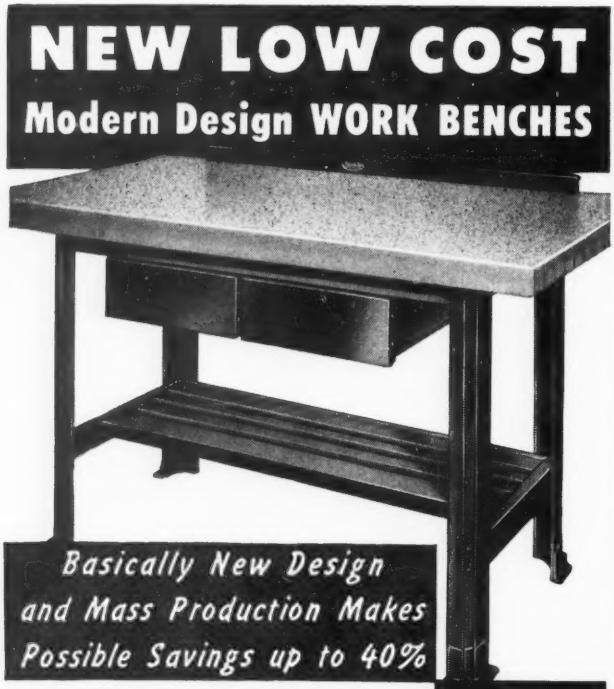
4501 Alpine Ave., Cincinnati 36, Ohio

Dust Collectors. A two-color illustrated bulletin (No. 637) released by Aget-Detroit Co., 207 Main St., Ann Arbor, Mich., presents a case history showing how dust from 27 grinding wheels in the toolroom of a compressor manufacturer is being controlled by a standard pretested Dustkop Dust Collector. The bulletin also provides specifications of the Model 90N50 collector.

Machine Tools, Special Machines, Grinders, Cutting Tools. A 32-page two-color General Products Catalog (No. 27312) released by Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich., shows in a condensed form virtually all of the company's products, ranging from machines to cutting tools. The catalog affords information on what additional literature is available to provide more data and specifications on any particular machine or product.

External Gear Lappers. A four-page illustrated bulletin (No. 993-5) describing external lappers for lapping external gears from ½ to 20 inches in diameter is now available from Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. The bulletin provides descriptions and specifications for the Model 993 Universal Duplex Lapper that can be used to lap mating gears together, one gear with two laps, or two gears on a cluster with one lap each. Similar information is given for the Model 995 Two-Lap Gear Lapper for high production lapping of moderate and small size gears.

Tungsten Carbide Products. A 72-page general catalog (No. 52-G) offered by Metal Carbides Corp., Youngstown 7, Ohio, covers its full line of tungsten carbide products, including cutting tools, draw dies, bushings, gages, centerless blades, rolling mill work rolls, diamond wheels and wheel dressers, and solid carbide stock. Extensive engineering data are included on speeds and feeds, brazing and grinding instructions, grinding wheel recommendations, coolants, and so on.



New Sturdi-Bilt exclusive patented "Tension Bolting" revolutionizes work bench construction! Assures rigid, vibration-free frames, economical shipping, mass production and low cost. New type Sturdi-Bilt tops are warp and splinter-proof, dent and abrasion resistant, have twice the hardness of hardwoods. Adjustable legs. Available with or without drawers in four sizes. For full details, specifications, prices, write for special Bulletin No.

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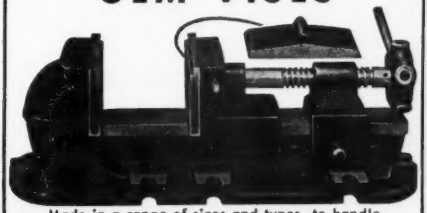
Groove Pins. John Gillen Co., Inc., 2542 S. 50th Ave., Cicero 50, Ill., has released a six-page two-color folder describing and illustrating its line of groove pins for use as locating or dowel pins for motor bases or pillow blocks; fastening pins for gears or gear trains; replacement cotter pins; hinge pins; stop pins; clevis pins; yoke pins for fastening pulleys, gears, collars, and cams to shafts; and other uses. A four-page catalog sheet giving list prices of the various types of groove pins is available with the folder.

Carbide-Tipped End Mills. A four-page catalog (No. 129) released by Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich., describes and illustrates its line of carbide-tipped end mills designed for use on steel, cast iron, malleable iron, brass, Dural, aluminum, magnesium, and plastics. Complete price lists and specifications for each type end mill are included.

Hannover Machine Tool Fair. An eight-page report on the Hannover Machine Tool Fair held last September in Hannover, Germany, is now being distributed by George Scherr, Inc., 198A Lafayette St., New York 12, N. Y. The report includes illustrations and descriptions of various machine tools and gaging devices displayed at the fair.

"Operation Delicate" is the title of a four-page two-color folder issued by Jas. H. Matthews & Co., 3942 Forbes St., Pittsburgh 13, Pa. The folder describes and illustrates the "Airgrit" marking device which operates on a forced blast principle for marking stainless steel, polished metal, glazed ceramics, smooth glass, and other hard highly-polished surfaces.

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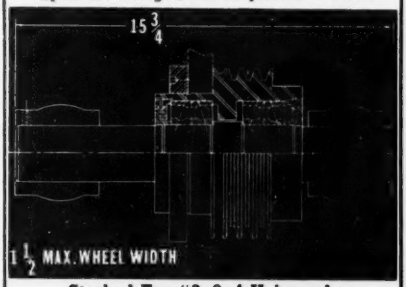
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SPINDLES

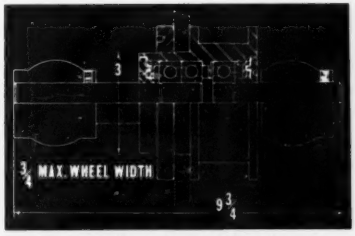
For Brown & Sharpe Universal Grinders

Spindles designed to fit present wheels



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No more plain bearings to scrape and run-in. Preloaded precision ball bearings allow no end shake. Wheels and belts are changed without exposing the bearings to grit and disturbing the adjustment. The bearings are grease lubricated and sealed at assembly. Write today for price and delivery for B&S #1, 2, 3, 4 Universal Grinder spindles.



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Carbide and High-Speed Tool Bits. An eight-page two-color catalog released by Whitman & Barnes, 40600 Plymouth Rd., Plymouth, Mich., fully describes and illustrates its line of Hercules carbide and high-speed tool bits. Complete specifications for each type tool bit are included.

Shapers. The Smith & Mills Co., 400 W. Madison St., Chicago 6, Ill., has issued a 12-page two-color catalog (No. 100) which provides complete descriptions and illustrations of the design features of its standard and heavy-duty lines of shapers. Specifications, as well as information on the uses and advantages of various attachments and accessories, are included.

Pressroom Equipment. A 12-page two-color catalog issued by Durant Tool Supply Co., 155 Orange St., Providence 3, R. I., fully describes and illustrates its line of stock reels, stock oilers, coil cradles, foot presses, roll feeds, scrap choppers, stock straighteners, and wire straighteners. Also included in the catalog are data on the company's "Select-O-Matic" Indexer. Specifications and price lists are included.

Adjustable Wrenches and Pliers. A 24-page illustrated catalog (No. 66-1952) issued by Utica Drop Forge & Tool Corp., Utica 4, N. Y., describes and illustrates its line of tools, including adjustable wrenches and pliers. A list of decimal equivalents and pertinent data on all Utica tools are included.

Electric Motors. A four-page two-color bulletin (No. 100) issued by Doerr Electric Corp., 100 N. Fourth Ave., Cedarburg, Wis., shows a wide variety of standard and special application designs of its line of electric motors which range from 1/30 to 5 h.p. Information on construction is also included.



this PRACTICE MAKES for PERFECT welds

Make it a practice to use Protect-O-Metal before welding — and get easy-to-clean, tough, more perfect welds everytime! P.O.M. cuts out spatter adhesion, improves fluxing, stabilizes the welding arc, saves 85% of weld cleaning time and labor—all for about 1/10¢ per foot of weld. P.O.M. No. 2, water soluble, goes on fast and welding can start *at once.* No fumes, no trouble. P.O.M. No. 8 dries hard in less than an hour, protects from rust and corrosion for months, and is a good paint primer. Spatter wipes off either in a flash! With P.O.M. and a little practice even amateurs can make more perfect welds. Order a trial gallon today.

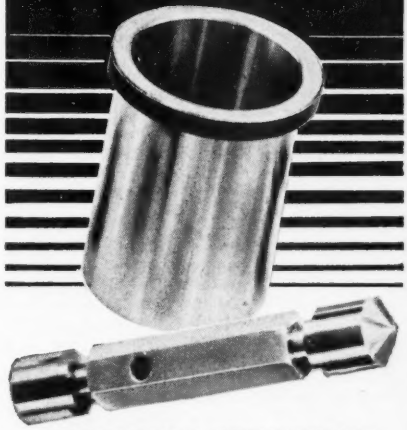
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MODEL JA
50,000 R.P.M.
Weight 12 ounces; length 6¾ inches; chuck size ⅛ inch. Wheel guard removed for better illustration.

$42 IN U.S.A.

THEY GRIND—NOT JUST RUB!

The RPM's stay up while grinding . . . not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind . . . not just rub. Every mechanic knows this, but an inexperienced buyer may order tools that maintain proper grinding speeds only when running idle. The speed of Kipp air grinders drops but slightly when put to work. That means better work . . . longer wheel life.

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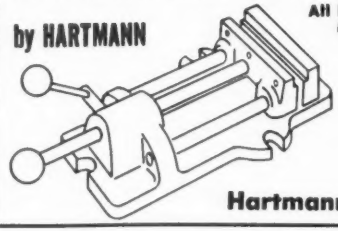
Air Cylinders. A four-page two-color bulletin released by The Tomkins-Johnson Co., Jackson, Mich., fully describes and illustrates its line of "Spacemaker" Air Cylinders which are available with double-end type piston rods (except the Model SM3). Complete specifications, mounting dimensions, and dimensional drawings are included.

Rotary Broaches. A four-page two-color illustrated catalog issued by Shearcut Tool Co., Box 746, Reseda, Calif., describes its line of "Shearcutter" Rotary Broaches for use with lathes, turret lathes, automatics, drill presses, and boring machines. Complete specifications are included.

Surface Roughness Height Measuring Equipment. A 24-page illustrated catalog issued by Micrometrical Mfg. Co., 345 S. Main St., Ann Arbor, Mich., fully describes its Profilometer equipment which measures surface roughness height directly in microinches. Amplimeter equipment, tracers, manual and motor-driven piloting equipment, and equipment in development are also discussed. Complete specifications are included.

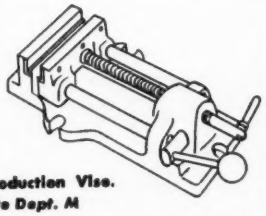
Hack Saw Blades. Victor Saw Works, Inc., Middletown, N. Y., has released a new schedule of blade sizes to meet new industrial standards adopted by the Hack Saw Manufacturers Association of America, Inc. The new schedule is said to be designed to streamline inventory, speed turnover, and, at the same time, provide an efficient blade for every metal-cutting need. In establishing the new schedule, a definite ratio between blade width and thickness was followed. The schedule has been adopted by United States manufacturers, as well as by Canadian and British producers, and is expected to be adopted shortly by a number of European nations.

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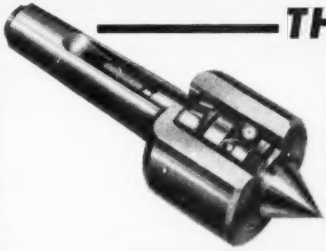
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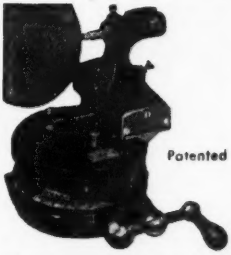
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That Eliminates Breaks in Profile at Points of Tangency.
NO TEMPLATES OR CRUSHER ROLLS REQUIRED!

The Jeon Dresser will dress a radius either concave or convex, with angles absolutely tangent on either or both sides of the arc, IN ONE CONTINUOUS OPERATION. Also, any combination of angles or arcs. *Write for Price and Folder.*
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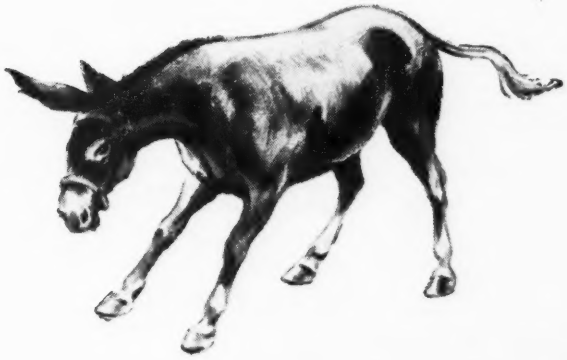
Hydraulic Presses. Clearing Machine Corp., 6499 W. 65th St., Chicago 38, Ill., has released a 28-page two-color bulletin (No. 216) which describes and illustrates its line of hydraulic presses. Complete information on features, such as the hydraulic circuit, hydraulic operating unit, stroke control, pressure control, and so on, is provided.

Precision Filing Machine. All American Tool & Mfg. Co., 8027 Lawndale, Skokie, Ill., has issued a four-page two-color bulletin which describes and illustrates its precision filing machine which files, saws, and hones. Information on features, as well as specifications, is included.

Carbide Tools. A 48-page two-color catalog (No. C-10) released by Nelco Tool Co., Inc., Manchester, Conn., describes and illustrates nearly 800 carbide tools regularly maintained in stock. The catalog is intended to serve as a ready reference for designers, tool engineers, production supervisors, and others interested in the production-increasing applications of Nelco carbide tools.



Jenny doesn't live here any more!



YES, in the modern coal mine there's no room for Jenny. Today, powerful electric locomotives pull 50 times the load that Jenny hauled to the mine surface.

And in today's mine, even the traditional pick and shovel are out-of-place! More than 90% of *bituminous* coal is now mechanically cut, over 70% is mechanically loaded. Result: more economical coal to light the way, fuel the fires, power the progress of America.

But, basically, what caused Jenny to disappear? What's behind American industry's ever-more efficient machines that turn out goods at lower cost—thus making them available to more people? One word tells the story—COMPETITION.

In the coal industry 5,000 privately managed coal companies compete with one another. When one company develops more efficient methods, the rest can keep pace only by striving to improve even further. No wonder that, with his modern machines, the American miner's daily output is 4 to 24 times that of any miner in Europe or Asia—most of whom work in government-controlled coal industries.

Just as competition spurs *you* on to trying harder—competition goads the individual company to deliver products that will outsell. And competition keeps a whole industry on its toes, cutting distribution costs, opening new outlets, delivering better products.

Competition—not government control—has already made America the most productive nation on earth. Competition—not regimentation—points the way to ever greater plenty for all of us.

★ ★ ★

This report on PROGRESS-FOR-PEOPLE is published by this magazine in cooperation with National Business Publications, Inc., as a public service.

THE COMPETITIVE SYSTEM DELIVERS THE MOST TO THE GREATEST NUMBER OF PEOPLE

Metal Spinning Tools. Available to department heads in industry or school instructors, a booklet describing metal spinning tools and their use has been issued by Boice-Crane Co., 937 Central Ave., Toledo 6, Ohio.

Industrial Steam Trap. Bulletin No. 351 descriptive of the Nicholson Type D Industrial Steam Trap for pressures from vacuum to 200 lb. is now available from W. H. Nicholson & Co., 136 Oregon St., Wilkes-Barre, Pa. Data on applications, construction, operation, list prices, dimensions, and sizes of the trap are included.

"Corrosion Prevention with Metallized Zinc or Aluminum" is the title of a four-page two-color bulletin (No. 62B) released by Metallizing Engineering Co., Inc., 38-17 30th St., Long Island City 1, N. Y. The bulletin describes and illustrates several typical applications, one of which is the application of metallized zinc to electric underground conduits. Various Metco metallizing systems are also described.

Button Head Socket Screws. Standard Pressed Steel Co., Box 566, Jenkintown, Pa., has issued a four-page two-color bulletin on its new line of Unbrako Button Head Socket Screws for doors, window frames, panelings, seats, refrigerators, washers, guards and cover plates of machine tools, and other sheet metal assemblies. List prices and dimensions of the seven standard diameters in which the screws are available are included in the bulletin.

Transfer, Centering, Milling, and Turning Machines. A four-page two-color illustrated catalog released by The Motch & Merryweather Machinery Co., 715 Penton Bldg., Cleveland 13, Ohio, fully describes its line of machines, including transfer machines, centering and milling machines, combination turning, boring, and facing machines, and form turning machines, for performing milling, turning, centering, chamfering, boring, facing, drilling, broaching, and cutting off operations.

"640" series

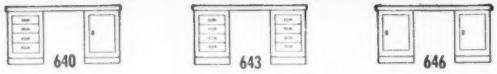
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Multiple unit design enables you to *custom build* these HALLOWELL benches to fit your requirements. Standardized construction permits individual or continuous installations . . . provides interchangeability with other HALLOWELL benches of similar dimensions. Stocked and sold by leading industrial distributors. Write for literature. SPS, Jenkintown 22, Pa.

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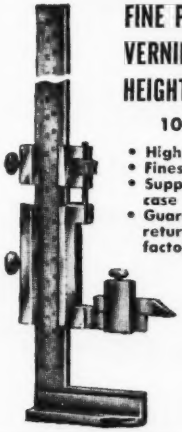
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18"..120.00
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Made by *Standard LSG Moment* (Western Germany)



Knife Edge Points for Dividing
Made of the Finest Steel in Germany

Graduation
0.025 with Vernier 1/1000" inside measurement on top
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Made by C. Stiefelmayer
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Graduated on both sides to read, by means of a vernier, in thousands of an inch. One end is of conventional design, and the other is equipped with a thin rod which can be used either way by reversing beam. The bottom surface of the base is 4" x 1/4"; blade 25/64" wide.

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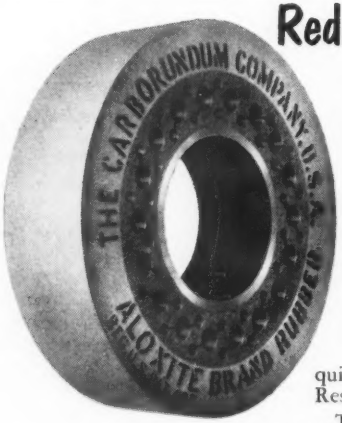
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Gas-Fired Furnaces. A four-page two-color bulletin (No. 241) released by Lindberg Engineering Co., 2469 W. Hubbard St., Chicago 12, Ill., fully describes and illustrates its gas-fired furnaces with vertical radiant tubes for carbonitriding, as well as carburizing, annealing, carbon restoration, and other hardening operations. Information on application features and a dimensional drawing are included.

Vibration Control. A four-page bulletin which illustrates a method for mounting lathes without drilling or lagging into the floor has been issued by The Felters Co., 223 South St., Boston 11, Mass. The bulletin shows how to use the company's Unisorb mounting pads and cement for mounting heavy-duty, production, and lightweight lathes.

Filtering Systems. A four-page illustrated bulletin (No. 14A) issued by Wm. W. Nugent & Co., Inc., 410 Hermitage Ave., Chicago 22, Ill., describes its line of filtering systems for coolants and cutting oils. Pressure-type filters and gravity systems are fully discussed.



Reduce those rejects in centerless grinding with the new

RESILIENT FEED WHEEL by CARBORUNDUM

To reduce rejects when you are centerless grinding armatures or other work that requires light but even pressures, change now to the new Resilient Feed Wheel developed by CARBORUNDUM.

The specially constructed resilient rubber core is the secret. It permits mild deflection of the wheel needed to eliminate the grinding pressures, and the faulty finish, created by conventional feed wheels.

This new ALOXITE aluminum oxide wheel is made in thicknesses up to 4"—in the standard feed wheel grading, A80-R2-R. Its use requires no change of grinding wheel gradings.

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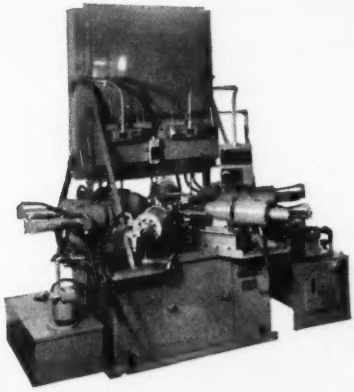
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81-34



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EXCEPTIONALLY fast drilling of 32 holes (3/16" diam.) in a steel part is made possible by this new machine which incorporates 8 Model HH Govro-Nelson Automatic Drilling Units, electrically interlocked with automatic, hydraulically operated clamping and indexing.

In operation, the operator places the part on a fixture and presses the start-cycle switch. The part is automatically clamped and 8 holes are drilled simultaneously at each of the four indexes, thus completing the 32 holes. Then the part is automatically unclamped. Output rate: Approximately 120 parts (3840) holes per hour.

If you have similar operations and would like to speed up your production rate, send samples and part prints and we shall be pleased to recommend the proper Automatic Units or quote on a complete set-up. Literature sent upon request.

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Detroit 8, Mich.

Automatic **DRILLING UNIT**

Special-Purpose Taps. A 1-page two-color pocket-size booklet released by Morse Twist Drill & Machine Co., Dept. MM-1, New Bedford, Mass., provides complete specifications on its new line of special-purpose taps. The booklet also shows how Morse Special-Purpose Taps differ from Morse General-Purpose Taps in either rake or hook angle, or pitch diameter. Information on the new Unified Thread Limits is also included.

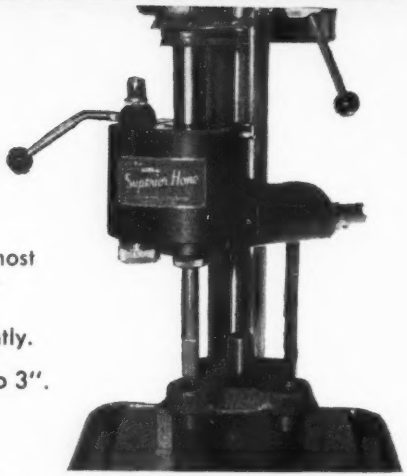
Sheet Metal Machines. A 32-page two-color booklet (No. 200-H) released by Niagara Machine & Tool Works, Buffalo 11, N. Y., describes and illustrates its line of machines and tools for light gauge sheet metal, including folders and brakes, power presses, rotary machines, formers, groovers, squaring shears, and hand and bench tools. Specifications for each machine are included.

Universal Joints. The Apex Machine & Tool Co., 1027 S. Patterson Blvd., Dayton 2, Ohio, has released a 32-page two-color catalog (No. 27) describing and illustrating its line of heavy-duty universal joints for aircraft and industrial applications. Featured in the catalog are application data sheets, perforated for easy removal, which provide a simple, concise means of indicating specific universal joint requirements. Specifications are provided for the No. 271 Series heavy-duty aircraft, No. 270 Series light-duty aircraft, and No. 300 Series heavy-duty industrial universal joint. Information on Apex Quick-Change Universal Joint Assemblies is provided.

"Service in Stampings," a 12-page two-color bulletin released by Laminated Shim Co., Inc., 3305 Union St., Glenbrook, Conn., describes and illustrates its facilities for producing stampings for a wide variety of applications. Available with the bulletin is a four-page two-color folder which features shims and stampings produced by the company. Specifications and application data are included.

MODEL VH

Superior HONING HEAD



Adaptable to most drill presses for honing heavier work conveniently.

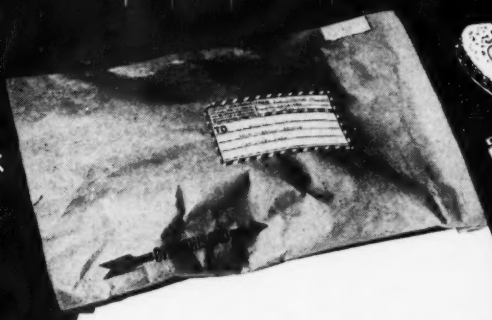
Range 3/16" to 3".

Size dial on bottom of head permits increasing or decreasing size while in operation. No stopping of spindle necessary. Lever on side releases stone from work and expands stone to same size under spring pressure on next part. Only adjustment necessary to duplicate size is for stone wear. *Write for folder.*

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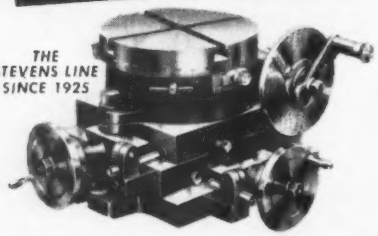
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Combines 3¾" longitudinal and 3¾" transverse movements with circular movement of 7½" Rotary Table. • Rotary Table and Compound Table can be used separately. • Larger No. 2 Compound Table also available.

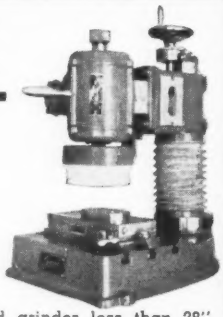
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Rotary Tables • Multiple Spindle Index Centers • Vises • Screw Head Slotters

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THE IDEAL PRECISION BENCH SURFACE GRINDER

A bench-mounted grinder less than 28" high, weight 210 lbs., that is truly a precision machine. Grinding spindle high precision balanced. Column accurately ground between centres. Feed screw nut and arm guide adjustable for wear. Graduated collar enables direct readings of 0.0008". Complete with 5" x 8" permanent magnetic chuck, cup wheel, dresser bracket. *Write today for literature*

Adams

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120 S. Clinton St. Chicago 6, Ill.

Ground Flat Stock. A four-page two-color bulletin (No. 52-803) released by The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill., describes and illustrates its oil-hardening tool-steel ground-flat stock which is available in various widths and thicknesses and in two standard lengths of 18 and 36 inches. Complete data as to the metallurgical analysis of the steel, as well as recommendations as to hardening, tempering, annealing, and grinding operations, are included.

Stamping Presses. A 16-page two-color catalog (No. G-52) released by Verson Allsteel Press Co., 9310 S. Kenwood Ave., Chicago 19, Ill., describes and illustrates its entire line of stamping presses. Condensed specifications are provided for standard mechanical and hydraulic presses and press brakes, as well as data on special machines.

Concentric Grinding Machine. A four-page two-color bulletin (No. CX-52) released by Landis Tool Co., Waynesboro, Pa., fully describes and illustrates its 4-inch concentric grinder which features microsphere bearings, annealed castings, and adjustable controls. Condensed specifications and outline dimensions are provided.

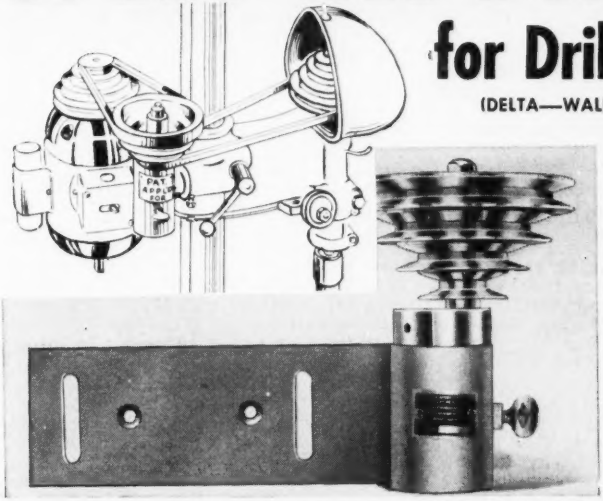
Tool Service. A six-page two-color folder issued by Rutland Tool Service, 1617 E. McNichols Rd., Detroit 3, Mich., describes and illustrates its facilities for the conversion of standard high speed and carbide cutting tools into special tools.

Taper Products. A 16-page two-color catalog (No. 37) released by The Collis Co., Dept. A, Clinton, Iowa, describes and illustrates its line of drill sockets, drill sleeves, cutter bars, chucks and collets, taper sleeves, lathe centers, sockets and arbors, lathe bushings, drill drifts, and pipe centers. Specifications are included.

Hack Saw Blades. Clemson Bros., Inc., Middletown, N. Y., has released a catalog announcing a new schedule of blade sizes to meet new industrial standards adopted by the Hack Saw Manufacturers Association of America, Inc. The new standards are said to reduce overall blade inventory requirements, both for users and dealers, since blade duplication is virtually eliminated. The standards have been adopted by United States manufacturers, as well as by Canadian and British producers, and are expected to be adopted shortly by a number of European nations.

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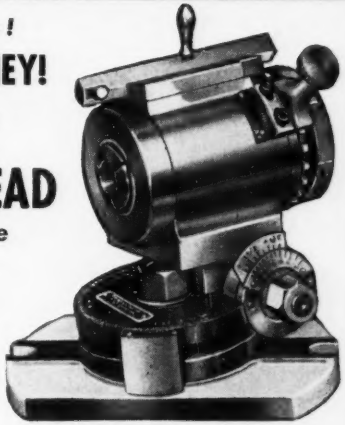
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Double-Acting Pneumatic Cylinders. A 16-page three-color bulletin (No. 9308-2) released by Industrial Products Division, Westinghouse Air Brake Co., Wilmerding, Pa., describes and illustrates its line of double-acting pneumatic cylinders which are available with foot, flange, or pivot mountings. Information on barrel construction, how to order, selecting cylinder diameter, and selecting cylinder levers is included, as well as complete specifications.

Rotary Tools. A two-color catalog (No. 207) issued by M. A. Ford Mfg. Co., Inc., Davenport, Iowa, shows illustrations and provides specifications on 363 shapes and sizes of high-speed rotary files, ground cutters, countersinks, rasps, carbide cutters, end mills, and grinding burrs. A "grade of cut" chart and a chart showing recommended operating speeds for both rotary files and ground cutters are included.

Precision Tap Sharpening. The special industry report, "How and Why Taps are Precision Ground," has been reprinted by Edward Blake Co., Dept. N-73, 437 Cherry St., West Newton 65, Mass., for circulation among metal-working executives. The article-reprint contains a clear, completely impartial evaluation of the precision tap sharpening method. Numerous charts and diagrams accompany the text to make the article exceptionally informative.

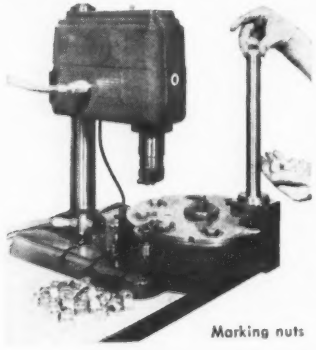
Flexible Cord. A 24-page illustrated bulletin published by Whitney Blake Co., New Haven 14, Conn., includes all of the new Underwriters' classifications for flexible cords manufactured by the company. Featuring catalog data on Dynaprene and rubber-jacketed cords, as well as braid-covered types, the bulletin also presents information on cord selection and how to order specialties, in addition to technical data of interest to users of wire and cable. Moreover, it contains illustrations of factory operations and laboratory facilities.

Drill Presses. A 12-page illustrated catalog (No. 5206) released by South Bend Lathe Works, 425 E. Madison St., South Bend 22, Ind., fully describes its complete line of 14-inch drill presses. Data on various applications, setups, and attachments, as well as complete specifications, are included.

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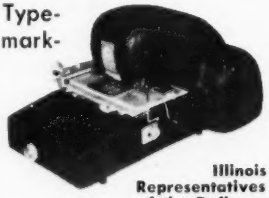
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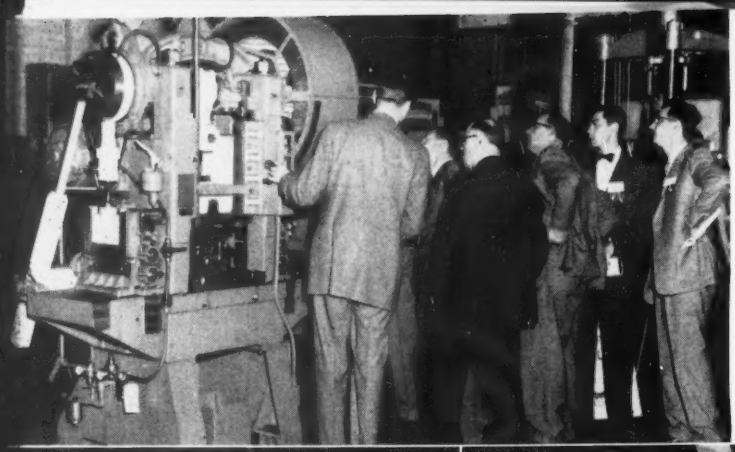
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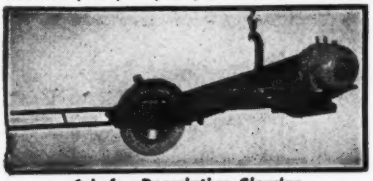
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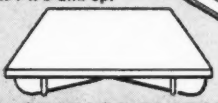


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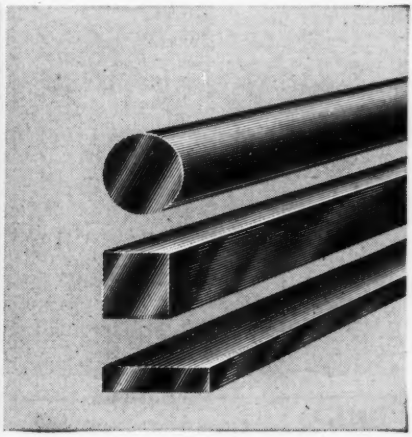
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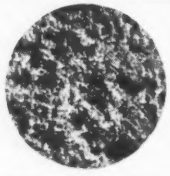
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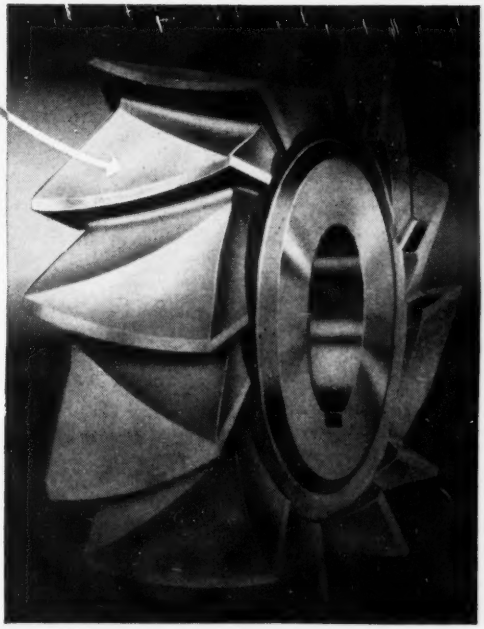
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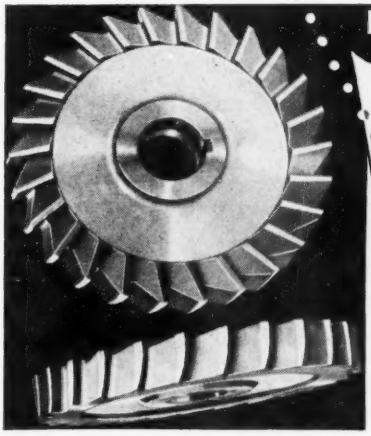
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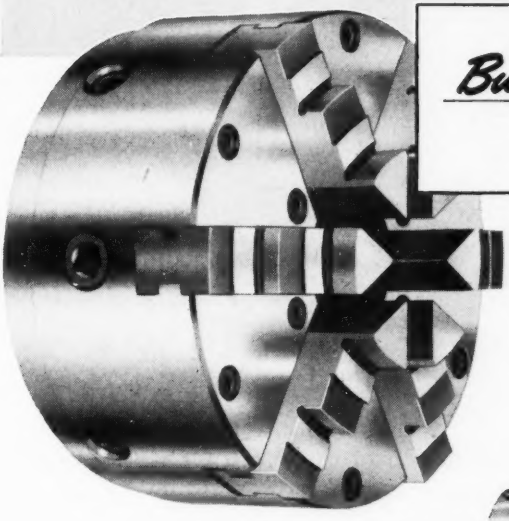
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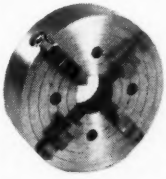


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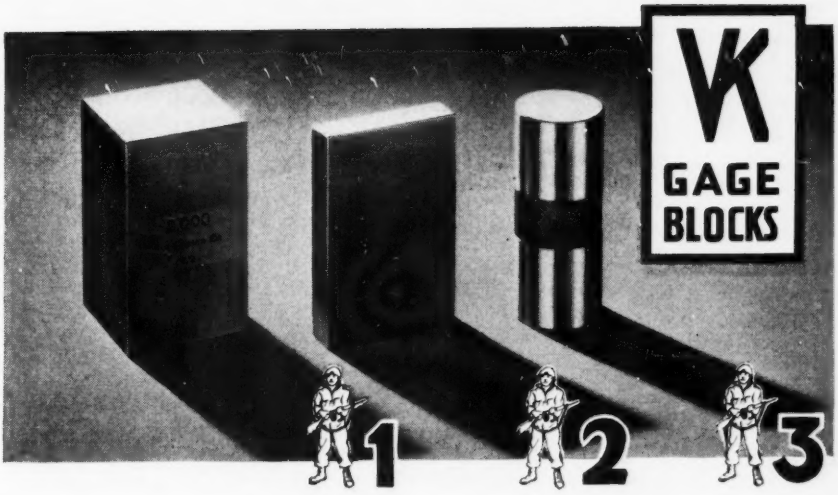
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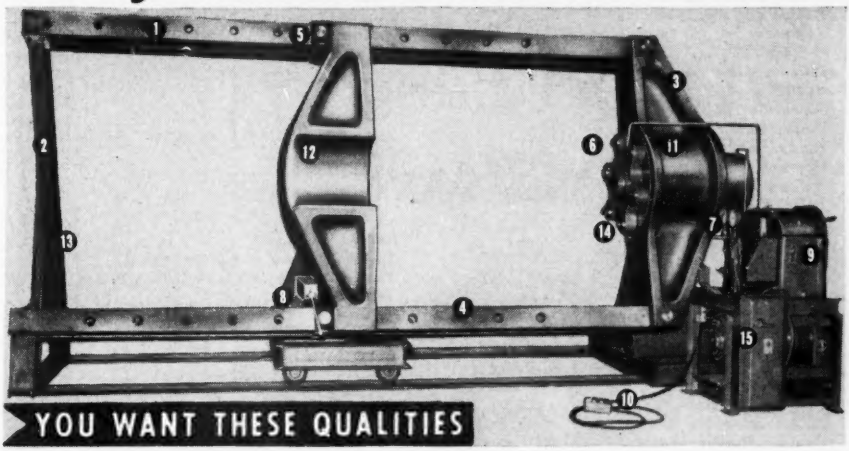
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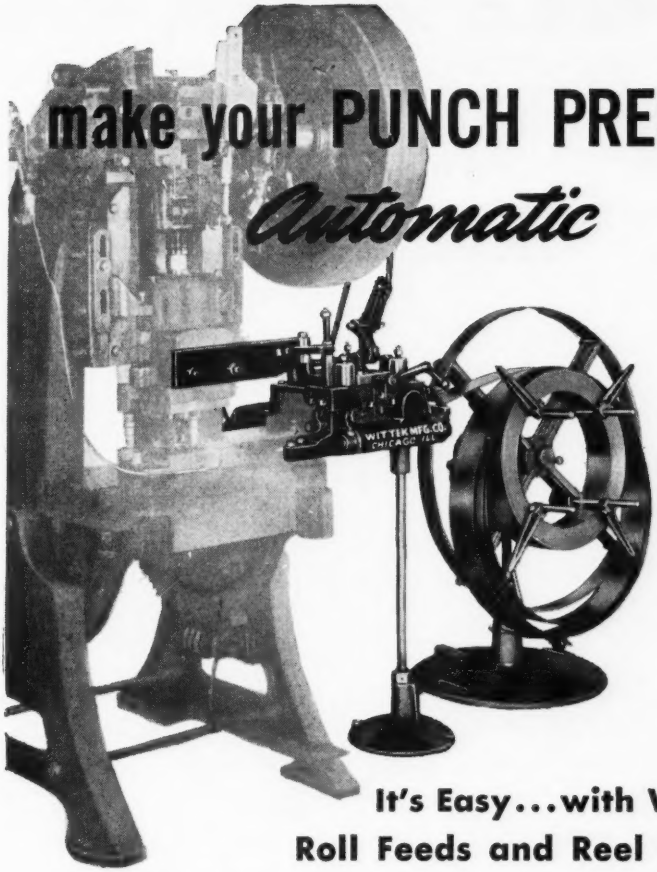
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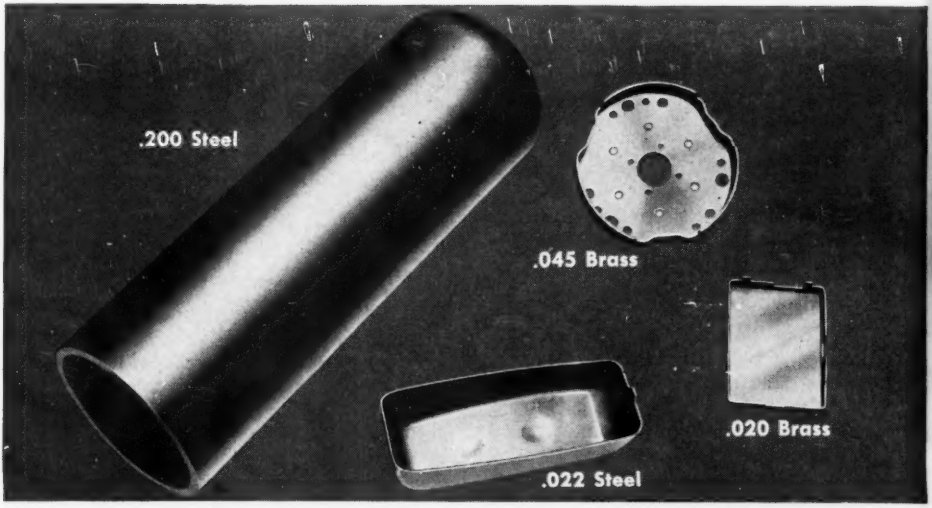
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. . . the last word

Stand-by Plants

A decision which will have a far-reaching effect upon the metalworking industry as a whole must shortly be made by those who are charged with the responsibility of directing our defense production program. In brief, the choice must be made of either stockpiling military end-items or stockpiling production capacity.

The Advisory Committee on Production Equipment, a group composed of leading production men from private industry and men with procurement experience in the Army, Air Force, and Navy, takes the view that our needs may best be served by adopting a policy of creating a larger capacity to produce military end-items.

The Committee's basic premise is that, since an adequate defense position must be maintained over an extended period of time, the expansion and maintenance of production facilities backed by limited reserve stocks of finished weapons will provide a more economical starting point for the rapid expansion of munitions output in the event of an all-out war.

If such a proposal is adopted, it will mean the construction of plants to supplement those we already now have and the providing of these new plants with tools and equipment.

It is quite obvious that even the most modern military weapon is frequently rendered obsolete by new developments and improvements. To stockpile a military end-item in great quantities might, in the actual time of need, prove to be the most costly and wasteful method of meeting the emergency.

In the past, we have witnessed the costly procedure of first providing facilities for the manufacture of military supplies and equipment followed by the dismantling and scrapping of these facilities when a need no longer appeared to exist. One example during World War II was that of an aircraft plant whose cost, including buildings, machine tools and other equipment, amounted to nearly $42 million. The cost of rehabilitating it for use in the current program was nearly $36 million. If this plant had been maintained and modernized as the need arose, the cost would have been much less and valuable time would have been saved.

The decision to actually try out the stand-by plant concept might well prove to be a wise decision.

—:—

Continued Interest

AT the moment, it is rather difficult to find many people who would not agree that the reigns of our Federal Government have passed into capable hands. The new President's record of past accomplishments speaks for itself. His managerial ability has more than once proved adequate to the demand. His skillful handling of military problems, however, will be dwarfed by the magnitude of the decisions he will be required to make daily in his position as President of these United States.

A majority of the people, by their votes cast in the election last November, made their wishes known. They made it unmistakably clear that they were not satisfied with conditions as they were and desired a change.

Far too often do we consider our jobs as good citizens finished when we have cast our votes in an election. If our democratic system is to survive, election day must not become the only day when we make our wishes known. Those men whom we elect to serve in government will serve us best only insofar as we let them know what we want them to do.

Fred W Vogel



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MODERN MACHINE SHOP

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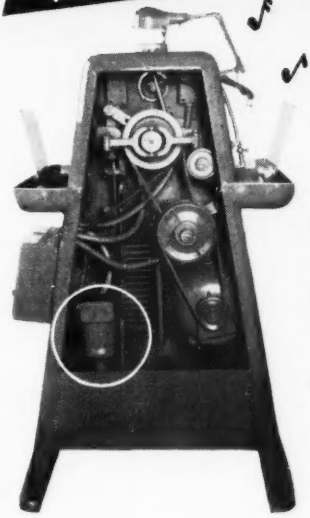
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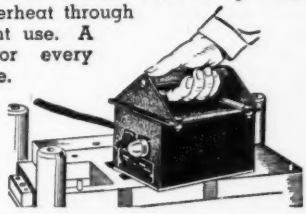
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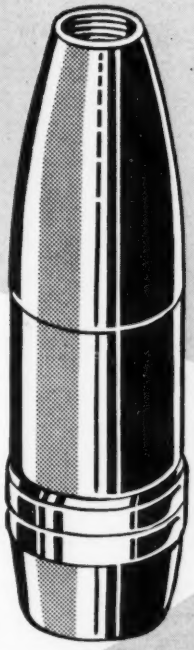
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(2) drill faster

(3) drill more holes per grind

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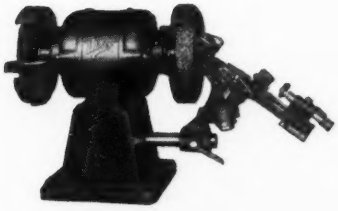
(5) reduce breakage

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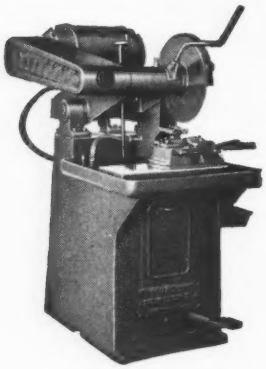
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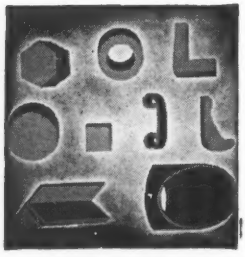


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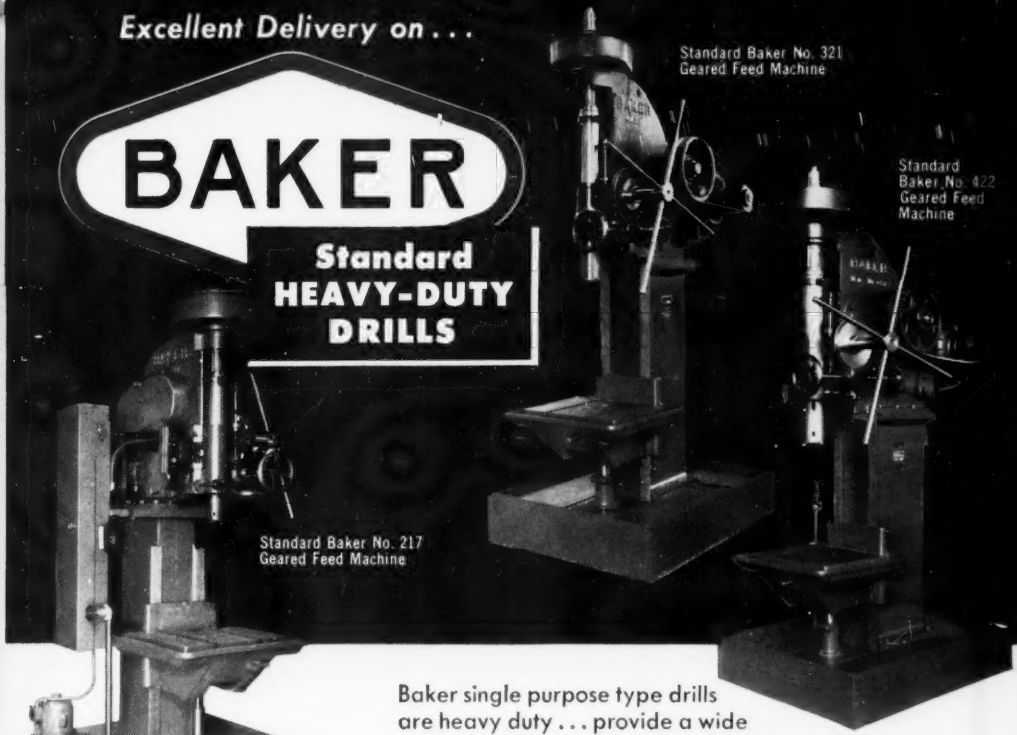
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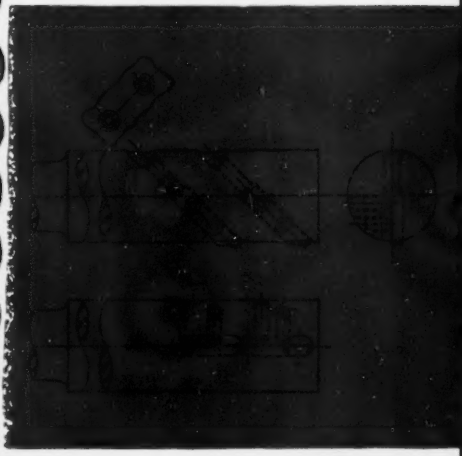
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